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Commonwealth of Pennsylvania.

REPORT OF THE

# Department of Fisheries

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From December 1 : 1911  
To November 30 : 1912

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DEPARTMENT OF FISHERIES OF THE COMMON-  
WEALTH OF PENNSYLVANIA.

**Commissioner of Fisheries.**

N. R. BULLER, office, Harrisburg.

**Board of Fishery Commissioners.**

JOHN HAMBERGER, Erie. 52975  
HENRY C. COX, Wellsboro.  
W. A. LEISENRING, Mauch Chunk.  
JOHN C. OGDEN, Johnstown.

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LETTER OF TRANSMITTAL.

Honorable John K. Tener, Governor of Pennsylvania.

Sir: Herewith we have the honor to transmit to you the report of the operations of the Department of Fisheries for the year ending November 30, 1912.

Respectfully,

N. R. BULLER, Commissioner,  
JOHN C. OGDEN,  
W. A. LEISENRING,  
HENRY C. COX,  
JOHN HAMBERGER.

## REPORT

OF THE

## BOARD OF FISHERY COMMISSION.

Honorable John K. Tener, Governor of Pennsylvania.

Sir: The Board has the honor to herewith present its report of the operations of the Department of Fisheries for the year ending November 30, 1912:

During the year the work of the Department has been bringing to completion all the hatcheries so far as it was possible with the funds at its command, while at the same time the work of propagating fish was continued, though somewhat hampered by the work of completion.

Much of the work was concentrated at Corry, where plans were drawn up by a competent engineer for utilizing all the space available at that hatchery, contracts were then awarded for the rebuilding or rehabilitation of the old ponds with reinforced concrete of the most substantial character, and two sets of ponds attest the quality of this work. When completed the Board believes that the Corry hatchery will have no superior as a trout hatchery in the United States, where with its natural beauty, it will be an ornament and credit to the Commonwealth.

At Bellefonte a pipe line was laid up to what is known as the Blue Spring whereby the ponds are now fed directly from the spring instead of from the creek. This results in the water in the ponds being at all times clear and the operators are able to see the fish. A dozen concrete ponds were completed and considerable grading done adding to the appearance of the grounds. As in the case at Corry, an engineer has prepared the plans to be followed out in using all the lands available. Hatching House No. 1 is a frame building and must be replaced with a new one which will be of brick or concrete so that the structure will be permanent, and it is proposed that even the troughs in the hatchery shall also be of concrete. A steam plant will also be introduced that the house may be kept to a suitable temperature for the men who have to do their work in the winter time.

The Board is anxious to secure the services of the best class of men to train up as fish culturists and to induce such men to accept the places. The work which is arduous and takes long hours should be made as pleasant as possible. The fish culturist, in a sense, is a scientist, and should have every facility and comfort for doing his work. He should not be treated as a common laborer, but as a



skilled man, and the mere manual labor of the hatchery should be done by the laborer. The Commission hopes by adopting this plan to secure for Pennsylvania the highest class of fish culturists who will place the fish cultural work of Pennsylvania on as high a plane as that of any Government in the world.

At the Wayne hatchery the Department has secured the control of the Beaver Meadow Reservoir, which has an area of about 200 acres of water. It is thus certain to have for that hatchery a continuous flow of water and a place for breeding bass. Two large bass ponds of three acres each have been completed and much other work done towards making the hatchery a most complete one for the breeding of bass. The facilities for raising trout are equal to furnishing the supply for the northeastern counties of the State, while from the field work in the lakes, the Department is sure of a heavy supply of yellow perch, pickerel, blue gill sunfish and frogs. A new hatching house will have to be built for the handling of the eggs of yellow perch and pike-perch eggs taken from the field. It is proposed that this hatching house will be built of the most permanent material.

At Torresdale the Department is able to report the largest record for hatching shad, 26,500,000 being hatched. Through an arrangement with the New York Conservation Commission the Department received in exchange for 2,000,000 shad eggs, 500,000 muscallonge eggs, and 30,000,000 pike-perch eggs. The muscallonge eggs were hatched at Union City turning out extremely well and were planted in the western waters, the first time that Pennsylvania ever planted any muscallonge in the State.

At Union City another large bass pond covering about two acres was built and a new four inch pipe line was laid from the head of the property to supplement the present supply. The Union City hatchery is an auxiliary to the Erie hatchery for the hatching of the lake fishes, small mouth bass and blue gills, and it had a large amount of work devolved upon it during the past year, owing to the conditions at Erie. During the coming year there will be an enlargement of several ponds at this hatchery.

At Erie, owing to the outbreak of typhoid fever, the Department of Health ordered the treatment of the water with various substances whereupon the water proved extremely deleterious to the hatching of the eggs and all the eggs had to be shipped away to Union City where, however, they could be handled.

The last Legislature appropriated \$7000 for the erection of a new hatchery at Erie, but in the wording of the law the building is to be erected upon the present hatchery grounds. The Water Commissioners of Erie very generously offered to donate a plot of ground on the lake shore for the erection of a hatchery where it could be supplied from the raw water from the lake, the treated water, as shown above, not being suitable for the hatchery purposes. Unfortunately, under the wording of the law the Department has not been able to avail itself of this offer, and the Board recommends that the next Legislature transfer the money to the erection of a new hatchery upon the grounds tendered by the Board of Erie Water Commissioners.

The last Legislature appropriated \$20,000 for work upon a new hatchery on Presque Isle Peninsula. An opinion of the Attorney General was asked in regard to this appropriation and in that opin-

ion, which will be found in full in another place in this report, he was of the opinion that the appropriation was intended by the Legislature to be expended in the preliminary work incidental to the construction of an artificial hatchery and not for the purpose of cleaning, reclaiming and restoring ponds and channels as natural breeding grounds. The Board of Fishery Commission is strongly of the opinion that the general proposition of the construction of an artificial hatchery is too large a proposition to be handled by the Department of Fisheries and thinks that all it should do would be to restore and reclaim the ponds and channels as natural breeding ponds. It would recommend an appropriation from the Legislature for that purpose.

No work was done at Spruce Creek during the year as the destruction accomplished by the cloudburst last year so completely disabilitated the hatchery that nothing could be done except at a large expenditure of money, which money was not available. The Board is of the opinion that owing to the location of the hatchery, it is useless to try to maintain it, as its safety could only be secured by the erection of a dyke which would be so enormously expensive as not to be considered. During the year the ponds that were left were used as breeding ponds for fish sent over from Bellefonte.

At the Crawford county hatchery, situated at Conneaut Lake, in accordance with a decision made last year, no work was done, the grounds being under the charge of a caretaker. During the year the property was visited by two experts for the purpose of having their views on the desirability of abandoning the property as not being suitable for hatchery purposes. The visitors secured were Mr. Dwight Lydell, Assistant Superintendent of the Michigan Fish Commission, who is universally recognized as the best small mouth bass propagator in the United States, and Mr. James Nevin, Superintendent under the Commissioners of Fisheries of the State of Wisconsin, whose ability as a fish culturist is well known. The reports of these two gentlemen will be found in the report of the Commissioner of Fisheries and they fully justify the decision of the Board in recommending the abandonment of the hatchery at Conneaut Lake.

The question of the pollution of the streams still stares the Department in the face, but the Board is glad to say that there is a much stronger public sentiment growing every day demanding that the streams be no longer used as sewers. Manufacturers are beginning to recognize this fact and in by far the larger majority of cases, the operators have evinced the most laudable desire to co-operate with the Department in bringing about a better situation. The Board of Health is accomplishing great results in preventing the pollution of sewers into streams and this itself is an educator to the public of the vital importance of keeping the streams pure, not only for the public health, but in the case of the Department of Fisheries, making a place where the food supply can be raised and maintained for the public.

The Board is glad to say that the courts of the State are in accord with the purpose of enforcing the law in regard to stopping of pollution. One important case was settled during the year in the matter of a large paper mill which had been running refuse in the stream to the great destruction of fish life. The manager of the concern was arrested and convicted before a magistrate. An appeal

was taken by the defendant, and after a delay of nearly two years, the matter was finally fixed for argument before the judge of the county. Before the case came to trial, the defendant, feeling that the case of the Commonwealth was so strong, agreed to settle, pay the fine and costs and to do his best to install a filtering plant which would forever prevent the running of refuse into the stream.

The prosecution of pollution cases, if the guilty parties choose to fight, is an expensive and long drawn out operation, as shown by the example quoted above. If the Department is not to be hampered in this work the Board must ask the Legislature to make a more liberal appropriation than \$1000 a year for the payment of court expenses.

The Board must add, as it did in its report of last year, that if the work of enforcing the fish laws and controlling the pollution of the streams, there must be a more ample appropriation for the payment of wardens. This Commonwealth is a large one and a less number than 30 wardens cannot possibly do the work of patrolling and policing well. Under the last appropriation the Department has only been able to employ 10 wardens regularly and a few extra sporadically, and if they have done their work well speaks highly of the efficiency of the force.

Respectfully,  
 JOHN HAMBERGER,  
 HENRY C. COX,  
 JNO. C. OGDEN,  
 W. A. LEISENRING.

### REPORT OF COMMISSIONER.

Hon. John K. Tener, Governor of Pennsylvania:

Sir: I herewith submit my report of the Department for the year ending Nov. 30, 1912:

When the first settlers landed in Pennsylvania they saw before them an unbroken wilderness through which roamed at will a few Indians, a few, because the number of Indians that inhabited Pennsylvania, was comparatively small compared to the area of the State. Virgin forests covered most of the State and the waters of the creeks and rivers ran untrammelled and unsullied to the sea. While the Indians did some fishing, their methods were so crude and their fishing was so comparatively infrequent that the waters fairly teemed with fish, but with unsparing hand the settlers proceeded to sweep the woods from the land and pursue the fish with every kind of device. The clearing of the woods left the banks of the streams shadowless and destructive floods began to be common. Along the banks grew up towns and with the towns came manufactories of every kind and from these towns and manufactories poured forth streams of refuse that made sewers of the streams and converted the water into villainous poison in which all aquatic life was destroyed.

The Susquehanna river and the Delaware river teemed with shad, and during the open season people flocked to their shores to take the toothsome fish and salt them down for a winter's supply. So reckless was the fishing that even the roe was thrown away as not fit for food, and under this destruetful and wasteful method of taking fish, the supply of shad was constantly depleted until the extinction of the shad was threatened. In Connecticut, for instance, where the same method was pursued of taking the shad, the shad absolutely became extinct and were only restored by artificial propagation.

About fifty years ago the moment it became evident to thinking people that something must be done to preserve the fish or a valuable food supply would soon become a thing of the past, and no longer would the sport of fishing be one of the recreations of the citizens of Pennsylvania, laws began to be enacted looking to the preservation of fish, and finally the Legislature in its wisdom established the Fish Commission, whose duty it should be to devise means, not only to protect the fish, but also to increase the supply by means of artificial propagation, science having discovered that by artificial means the work of nature could be greatly supplemented.

The laws for protection failed at first to have the support of the dwellers along the streams and waters of the Commonwealth. They claimed that their fathers and grandfathers had fished as they pleased, and that they would do the same thing and efforts to punish violators of the law were rendered null by the sympathy of the people. Any person who would report the violation of the fish law by a neighbor was looked upon as an informer and gained the illwill of all his neighbors. Constables were charged with the duty of enforcing the fish law and are required to report all cases to the court, yet

not one constable in a thousand would do so, or will do so today. He looks to neighbors for votes and in many cases is also a violator of the law.

Education, however, has done much to show the people the importance of the measures for the protection of fish life. It is becoming a matter of common knowledge that if fish are taken during the closed season, when the fish are spawning, it is much like killing the setting hen from whom it has been hoped to obtain a brood of peeps. Not long ago a prominent farmer who had been a member of the Legislature was persistent in taking pickerel out of season. When expostulated with and told it was in violation of the law he claimed that the fish in question had been placed in the pond on his farm by his grandfather and that he was entitled to take them when and how he pleased. When his attention was called to the matter that the fish he was taking out of season were, in nine cases out of ten, females, heavy with spawn, he began to see the light and finally was so convinced that he is now one of the warmest supporters of the law.

The complaint comes to the Department most frequently that since the protective laws the fishing is not so good as it was years ago. The complainants forget that there are a hundred fishermen now where there was only one, years ago, and that the number of destructive devices in the way of nets and spears and dynamiting are multiplied in the same proportion as the fishermen. The man with the illegal net or with the dynamite cartridge destroys thousands of small fish that he may obtain a mess of large ones for himself. Gradually, however, as stated above, there is growing to be a respect for the law and the public have come to understand that in restocking the streams the same care must be exercised for the little fish and for the nesting fish as there is for the care of the peeps and the watchfulness over the setting hen, if one wishes chickens and eggs.

So strong was the sentiment in some sections of the State against the enforcement of the law that for a number of years a president judge of one of the trout fishing counties of the State openly defied the enforcers of the law, and insisted that he had a right to obtain his fish no matter if the laws did declare it to be illegal. The law provides that no person shall take more than so many trout a day of a certain length and that the wild trout must not be sold, yet this same judge every year engaged a noted violator of the law to provide him with trout irrespective of the number and regardless of the size. With such an example, is it any wonder that the violations of the fish law in that county were extremely numerous, because even if a warden succeeded in convicting a man before a justice of the peace, the defendant would appeal to the court, and when the evidence was so convincing that there was nothing else to be done but sustain the conviction, the court would suspend the sentence.

Every year, however, as said above, finds the sentiment of the people in favor of enforcing the law, and the number of violations by illegal devices is greatly reduced. The practice of drawing off dams for the purpose of taking fish by all manner of means whereby possibly several hundred edible fish were obtained and thousands upon thousands of little fish left to die, has been almost totally abandoned. Here and there comes the story of a dynamiting, but it

is mostly done by the foreign element whose idea of liberty is license.

For years cities and towns have poured their sewage into streams undisturbed, and thousands of manufacturers have run all kinds of refuse, much of it poisonous, into the streams. The question of water supply, irrespective of fish life, has become so important that the Legislature has adopted drastic legislation in regard to sewage and the Department of Health is today compelling such disposition of the sewage that it will no longer be a menace to public health by contaminating the water. In the same line the Legislature has adopted legislation to put a stop to the running of the refuse from the manufactories in the streams. Unfortunately, the amount of money appropriated for use of the Department of Fisheries in stopping the pollution by manufactories is inadequate for the work, one thousand dollars a year being all that is given for the prosecution of offenders and from this thousand must be taken the money necessary to pay the court expenses of all the minor violations of the fish laws.

While the law authorizes the appointment of thirty wardens the appropriation granted only allows the employment of nine for the full term of two years. Fortunately, the Department has found that in the large majority of cases the manufacturers are anxious to co-operate with the Department in bringing about the clarification of the streams. Perhaps some of their motives are selfish, but it is not always fair to judge motives. The manufacturer who has to clarify the water poisoned by some manufacturer above him, is beginning to feel some sympathy for the man below, and he realizes that if the man above cannot pollute the stream he will not be at the expense of purifying the stream and that saving can be used to purify his own refuse. The average citizen thinks that it is only necessary for the Department to notify a manufacturer to cease and the work is done, but this is not the case in regard to a recalcitrant manufacturer and the citizen himself shirks that duty when he is damaged by not himself bringing suit for damages.

Much, the Department thinks, has been accomplished during the past year, by a meeting of the manufacturers at which this question of pollution was discussed and plans devised for the clarification of the refuse. With an appropriation commensurate to the needs of the Department in this matter of pollution there does not seem to be any reason why the question of pollution cannot be settled in a few years in the same satisfactory way that the sewage problem is being settled by the Department of Health.

Acting on the suggestion of the Governor, the Department has decided during the past year not to bring sporadic cases of prosecution here and there, as has been urged to do by various complaints, but has taken up one water shed, visiting every manufactory along the stream, and notifying the operators thereof that the pollution must cease. Samples of water were taken, the effect of the refuse upon fish life was experimented with and the water submitted to a chemist for analysis. If within a brief period the pollution is not stopped, prosecution will be brought against the most flagrant violators in this section. This policy, it is hoped, will clear up that water shed and then a new one will be taken up. It is hoped, however, that the coming Legislature will grant an appropriation which will enable the work to be carried on a wider scope.

The economic value of the fish as a food supply cannot well be estimated, but unquestionably it runs into thousands of dollars. That the supply of fish can be kept up with wasteful and extravagant methods of fishing is impossible, but with regulation there is no question that with the success of artificial propagation so well known today, the streams of the State can be kept so well supplied with fish that the angler may be rewarded every time he goes fishing and the family larder be well supplied with fish food.

Feeling that the successful propagation of fish can only be thoroughly accomplished by the most complete hatcheries, the same as all good work requires the best of tools, the work of the Department has been concentrated upon completing the hatcheries selected in the most permanent and substantial manner. At Corry, for instance, much work has been done in rebuilding the ponds with concrete, so that they present not only a handsome appearance, but have a permanency that will make them last for years and do the best work known to the fish culturist. No work of a temporary character was done at any of the hatcheries.

Shortly after taking charge of the Department, as mentioned in my last report, a disastrous cloudburst swept through the hatchery at Spruce Creek tearing out the ponds and razing the hatching house. Shortly after this first flood there came another which completed the destruction started by the first one. There were no funds available to restore the hatchery to its former position and it was placed in charge of a caretaker and the ponds that were left there from the flood, used as retaining ponds for young trout sent there from Bellefonte. The situation of the grounds is such that it is always liable to disastrous floods, because Spruce Creek, just above it, runs through steep hills and when there is any unusual rainfall, the creek rises with a tremendous rapidity, and as soon as it reaches the hatchery, spreads out over the grounds carrying destruction in its path. It therefore seems but useless expenditure of money to maintain a hatchery at this place, and I would suggest its abandonment and the sale of the grounds.

That artificial propagation of fish can restock the waters of the Commonwealth if the laws against wasteful destruction are enforced is plainly shown in the case of Lake Erie. It is not many years ago, since the white fish industry had so deteriorated that it was not worth while to set the nets and the same was true in a minor way in regard to other fishes. The constant restocking of the lake by the United States and Pennsylvania Governments has restored this fishing in Lake Erie, until it has made Erie city the largest fresh water fish market in the United States. At Erie, however, the fishermen have learned that their livelihood depends upon co-operation with the Government in this matter of planting fish, and also in the enforcement of the laws against destructive and wasteful fishing. There is no doubt, with the same co-operation with the other fishermen of the State, that great work could be done in restocking the streams and providing a food supply.

How important the vegetation and hiding places in the stream are, is shown in a way by the fact that only a few years ago, in a great ice flood, the bottom of the Susquehanna river was almost scoured clean of grasses, weeds and aquatic plants. For two or

three years after that the fishing in the Susquehanna kept constantly deteriorating, because there was no little fish able to grow up but in time, nature replanted the river herbage, and the fishing has been getting better and better.

It does not mean that the Department shall furnish all the fish that the people will take, but by constantly adding new blood it will enable the fish in the stream to always help in keeping up the supply. It is well known that fish deteriorate by inbreeding as does any other species of animal life, and we might say vegetable life, because the farmer must get new seed if he wishes to keep up his crops.

The pollution of the streams has been caused by that careless habit of wastefulness which characterizes the American people. Immediate profits and a disregard for the right of the people living below on the stream were the causes of every manufacturer allowing his refuse to flow away. Nature works in a different way and never wastes. The tree grows in the forest, taking up certain constituents from the soil and carbonic acid from the air, giving out the oxygen necessary for the life of animate beings. The leaves bud, grow and ripen, then fall to the ground where they decay and furnish food for next year's growth. The wood acid manufacturer cuts down the tree, takes it to his manufactory where he distills the compounds that he desires and allows those he does not want to discharge into a stream to render the waters of that stream unfit for fish life or for any use by the people below him. Were he as economical as nature, all these products would be made to subserve some useful purpose and none would be allowed to flow to the detriment of his neighbors.

The saving of all these products is, of course, a question of cost, yet science is daily solving all these problems. For years the manufacturers of coke wasted millions of feet of gas whose conservation would have done much to add to the receipts of the coke burner. At the Bethlehem Steel works recently there has been installed a series of coke making ovens, from which every possible constituent of the coal is saved and not a particle of refuse is run to defile the stream.

What can be done with the coal can be done with the tree by the acid maker. The makers of gas are learning by experience that everything that escapes them is a waste and a loss and the gas manufacturers are putting in plants like the coke works at Bethlehem from which nothing whatever will escape.

In Germany, not many years ago, the streams were foul sewers, due to the pollution of sewage and the refuse of manufactories. The paternal Government said stop and today the streams are running clear and not a particle of waste escapes from a manufactory. As a McKean county chemical manufacturer who had just returned from a visit to Germany, remarked, "even the smells are turned to economic uses." Dirt has been described as matter out of place and the waste of pollution is simply unutilized matter which public policy demands shall not be used to destroy or interfere with any other's rights, and the world's common demands should be utilized

and turned to gold. What has been successfully attained by the coke manufacturer can be attained by the manufacturer of everything else.

With the cutting of the forests and the clearing of the under-brush many trout streams became warmer and unfitted for trout, while in the others there was a cutting off of the food supply and shelter for the young fish. The logs and brush which filled the streams in the primeval days afforded not only hiding places for the little fish, but breeding places for the food upon which the little fish subsisted while the bushes and weeds were the nesting places of all kinds of insects from which the larvae dropped into the stream to afford food for the other fish. This lack of bushes along the streams is the main reason why so many trout streams will not support the number of fish that they used to do, because there is not that supply of insect life which there formerly was. In cases of streams which were suitable for trout there can be nothing better than to throw brush and logs into them, and cultivate alders and weeds along the banks. As said in the previous part of the report, the number of fish that a given quantity of water will support depends entirely upon the amount of food that can be furnished to the smaller fish, with always a provision, as mentioned above, for additional supplies for the grown fish.

In the more cultivated parts of the country the old trout streams have so warmed up that they are no longer fitted for the life of the brook trout, and all experiments to restock these streams with the speckled beauties have proven failures. The brown, or German trout, will, however, live in much warmer water than the brook trout, and many of the old brook trout streams in which no longer brook trout will live, are being restocked with brown trout to great advantage.

While to many the brown trout is not an equal in game qualities to the brook trout, yet it is a far superior fish in game qualities, that will live in the streams that it will, and therefore it is a sort of Hobson's choice. In some sections of the State, the brown trout has really become the favorite and the anglers are clamoring for brown trout. To meet this want the Department is increasing its stock of brown trout breeders and will try and keep it up so as to furnish all the demands upon it. For a number of years California or rainbow trout have been planted in the streams of the State, but the catches reported are but few and far between showing that the habitat is not a favorable one for these fish. In their native sections these trout spawn in the spring, and it was thought that it would be a good supplement to the brook trout in the Pennsylvania hatcheries to add the rainbow trout, which would come in when the troughs were empty of the brook trout. Unfortunately, however, the rainbows have taken on the habit of spawning about the same time as the brook trout, and, as shown above, they do not seem to increase in the streams and their propagation does not seem to be desirable.

At a recent meeting of the American Fisheries Society at Denver, the matter of rainbow trout was discussed, and it seems that the habitat of these trout in Colorado is almost at the snow line where the water is always little above the freezing point. Here the rainbow trout grow and thrive and grow to a size of 10 to 15 pounds and

a yard in length. Below the snow line the native or cut throat trout thrive and are the fish that are placed in those streams. There are no streams in Pennsylvania which correspond to the streams in which the rainbow trout dwell in Colorado, and this would seem to explain the reason why the rainbow trout have not succeeded in Pennsylvania, in spite of the millions planted by the United States Government and the Pennsylvania Department of Fisheries. The Department finds that there is much misinformation in regard to the trout and has many applications for California trout, of which there are none in Pennsylvania, the applicants wanting brown or German trout.

The same thing in regard to the streams not inhabited by trout applies as it does to the trout streams: the question of food supply. It is, as has been shown, impossible to stock a stream and maintain it so, if there is nothing for the fish to live on. The little ones starve to death or if there are no hiding places they are gulped up by the large ones, all fish being cannibals.

In stocking the streams also, few people understand really what they want and apply for fish that would in no way thrive in the streams for which they are applied for. To meet this question and enable the Department to obtain some idea as to the character of the fish which should go into a stream, the Department has prepared a blank application on which the applicant can furnish information as to the character of the stream and thus enable some kind of a judgment to be formed as to what fish would thrive in the water in question. Black bass will not thrive in trout streams nor will trout thrive in streams suitable for bass, yet numbers of people apply for both fish.

In many of the streams of the Commonwealth, the water is only suitable for such native fishes, as shown above, dwell in the lakes, but supplemented with the minnow family, which is a large one, but a very important one in the eye of the boy fishers to whom the taking of a fall fish is an event. Indeed the fall fish is no mean game fish and not despised by many of the most expert anglers. The chub is also a variety of the minnow family, which brings joy to a boy's heart when he catches a good sized one. The smaller minnows afford food for the large ones and are the main dependents of the angler for bait fish.

While the Department strives to cater to the angler with such game fish as the bass, the trout, and to keep up the supply of the commercial fishermen in white fish, herring and shad, it also feels that there is a great work before it in keeping up the supply of fish for the boys and girls and for those anglers that frequent the streams as they do the lakes. The fall fish and chub are mentioned above, yet the blue gill sunfish is a fish not to be despised, as according to its size it is as gamey as the trout while there is nothing better as a pan fish except the yellow perch.

There should be some changes in the law which will allow the Department more latitude to assist the farmers to raise fish, as there is no question that a profitable adjunct could be made to the farm or an assurance of an addition to the food supply be made by the adding of a fish pond to the farm. The sunfish, the yellow perch,

and the bull-head will thrive under favorable conditions and their fecundity assures a constant supply, if the fish have any sort of chance as to pure water and food.

While here the Department would suggest that the growing boys and girls of the Commonwealth be more instructed in the life and ways of fish. If a boy and girl are shown that a sunfish builds a nest as neat and cozy in its way as a bird builds its nest, that it is the neatest of housekeepers, removing every particle of dirt or trash that floats into its nest, and then watches as carefully over its eggs as a hen does over hers, it will open their eyes. It will awaken an interest in them that will grow with their years and they will become the advocates of the enforcement of the law which forbids the taking of fish from the nests whereby the fisherman gets one fish and hundreds of little fish go to destruction.

If a boy or girl should be shown how sunfish will dart at a hook baited with a worm thrown over its nest, not for the purpose of swallowing the worm, but for the purpose of keeping its nest clear, he or she will soon take an interest in the matter, that neither he nor she will ever strive to hook a fish on the nest or allow any one else to do it, if he can be disuaded. A knowledge of the habits of fish would be the greatest step towards securing the enforcement of the laws for the protection of fish.

The sucker, too, has many and warm admirers, while the expert angler looks upon them with contempt, but this is not shared by hundreds of other persons who look upon the sucker as an extremely desirable fish. Really in the early spring when the water is cold, if it were not for its bones, the sucker is quite an addition to the table. So much is the sucker a favorite with many that the Department has applications for permits to net trout streams in the spring for the purpose of taking the sucker, the applicant stating that they have no desire for the trout whatever and are perfectly willing to leave them in the stream for those people who want trout.

To the lover of trout this taste may seem curious, but it takes all kinds of tastes to make up a world after the manner of the old woman who kissed the cow. It is not long since that a warden arrested a man with a bucket of small trout that he had taken for the purpose of using them as bait for eels. This to the trout man seemed a crime that he hardly had words to express. It is quoted here to show that there is a variety of tastes to be met when the Department of Fisheries is preparing to restock the waters of the State, if it is to suit everybody.

This nature study will not only teach people to use their eyes, but will lead them to an open air life and they will see all the ever charming beauties of nature. They will find sermons in stones and books in running brooks and store in their minds much lore that will prove an ever source of pleasure in advancing years. Their eyes will be trained to see what the average person misses, and no longer will they be in the state of the man to whom

"A yellow primrose nodding by the river's brim,

"A yellow primrose is to him and nothing more."

Instead it has become a thing of beauty whose charm increases the more it is studied. The boy or girl will watch the sunfish build its nest, or peeping over the bank, see the black bass build its nest

with equal care, and when the eggs are deposited in the nest they can watch the parent standing over the nest the perfect picture of alertness like a vidette on the very outpost of an army facing the enemy.

There is barely a motion, yet to the trained eye there is always an alertness and when a lumbering carp comes creeping down to prey upon the spawn in the nest, the bass darts at him like an arrow and soon drives him from his work of spoliation. When the fall comes the observer will see the speckled male trout take on all his most brilliant colors, red and golden, outshining the resplendent costume of the dandies of the court of Louis XIV. He jauntily selects a mate and together they wander up to some little rivulet, where they can deposit their eggs in a spot far from the enemies that they know will devour them. But in spite of the care of the parent fish, the life of the little fish that hatches from the eggs deposited in the native stream is one of constant danger. Spawn eating fish threaten the nest, a heavy shower washes the mud into the stream and it deposits over the spawn to smother the life out of the eggs, and when the little fish appear, even the minnows, only a mite larger than the little fish, prey upon them.

The bass who watches so carefully over its nest will when the little fish are a few days old, abandon them apparently to their fate, but will return in a few days and himself devour his own progeny. Here the fish culturist steps in, in the case of the bass, and when he discovers a nest of little bass he encloses them in a crib of muslin where the little ones live until they absorb their sacs and rise to the top, when the fish culturist takes them and places them in a breeding pond where there are no enemies, to shelter them. When a bass nest is cribbed, the nature student will be amused to watch the antics of the parent fish who is striving to reach his young. He will dash at the crib and many a time will force his way through the muslin guard that surround his progeny.

Then, too, there is the catfish, the most careful of all parents. When the little fish are born the parents round them up into a seemingly little ball much after the manner of the round-up by which the cattlemen of the west keep the cattle together. When an enemy approaches the parents actively fight it off and carefully keep their children gathered together.

The yellow perch lays its eggs in strings which unfold like a beautiful lace handkerchief and then the little ones are left to rock softly by the movement of the water and winds, much as a child is rocked in the cradle by its mother, but as the little fish begin to appear an observant eye will see around them apparently motionless figures of the larger perch, who at the appearance of a little one dash at it with the rapidity of lightning and it disappears into the voracious maw of the marauder. To prevent this destruction the fish culturist gathers these strings and places them in jars where by gently moving them by currents of water, nature is imitated and the fish are hatched and placed in ponds devoid of enemies.

The shad when it enters the fresh water no longer feeds, but swims its way toward the place where it was born that it too may propagate

its species. Not feeding it uses up its surplus energy in the work of swimming and spawns at full speed thus again using up more nervous energy. The result is that when the shad turns to go back to the sea it is in a very weak condition and it is estimated that at least 50 per cent. of them never are able to reach the salt water. It is really pitiable to see the shad as they approach the salt water struggling to reach the goal.

It is estimated that of the number of fish that are annually deposited, barely five per cent, survive, but when artificially propagated and kept from their enemies the number that survive runs from 50 to 95 per cent. Here is shown one of the great advantages of artificial propagation.

All this and more will be disclosed to the watching eyes of the student of nature, and as he or she has all these things unfolded before him a much better understanding will be formed and the Department will have so many more earnest advocates to encourage it in its work and assist it in its endeavors to once more restore fishing in Pennsylvania to what it was in former years.

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#### THE LAKES OF THE STATE.

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Comparatively only a small proportion of the population of Pennsylvania are aware of the fact that in some sections of this great Commonwealth there are hundreds of lakes as beautiful in their setting and in the clearness of their waters as can be found anywhere in the world, rivaling in beauty, indeed, those of the lake country made famous by the songs of Wadsworth. By far the greater number are situated in the northeastern part of the State, in Pike, Wayne, Monroe, Susquehanna and neighboring counties. They are mostly in that section situated high up in the mountains free from all contamination, and it is not likely that their waters will become contaminated in years to come. In Wayne county especially the mountain tops rise to a height of 2300 feet, and the lakes lie like pearls upon a necklace. A traveler will go far and wide but his eyes can revel in no more beautiful scenery than that of Wayne county with its rolling hills and mixture of woods and carefully cultured fields. In Pike county and Monroe the land is not so high, but the country is wilder, there being less cultivation, and except that the timber is mostly second or third growth, the country is almost as wild as in the days when the Indians roamed through it.

Railroads have opened up this lake country to the denizens of the cities and every year they are becoming better known and around a number of them have grown up resorts which attract annually hundreds of visitors, yet to the others there come also every year thousands of people to revel in the fresh life-giving air of the mountains which brings back roses to the faded cheek, while at the same time the lakes afford much sport and a great deal of pleasure to the angler.

In the early days all these lakes abounded in fish: The fish native to the waters being pickerel, yellow perch, catfish or bullheads, sunfish, suckers, and swarms of minnows, which latter afforded food for the larger varieties and bait for the angler. Some of these lakes have been stocked with black bass which have thrived, although experience seems to show that the voracious qualities of the bass have caused it to depopulate its habitations of other fish and render the fishing not equal to the lakes in which the bass have not been placed.

In the early days the lakes were full of trees, stumps, brush and many aquatic plants on which thrive the daphne and other microscopic water life which afforded food for the baby fish. It is well understood by fish culturists that the amount of fish life in a lake is limited by the amount of food which is yielded upon which the baby fish can feed. The fish when first hatched, carry their sacs upon which they subsist for a few days, but after absorption of the sac the little ones begin to feed and the number of little fish that will survive to grow up is limited by the amount of food that they can obtain until they are able to feed on other fishes. It is therefore extremely important that the birth places of the fish food for the little fish be ample and therefore all those who are interested in seeing the lakes teem with fish life should assist in the work of providing these resting places for the daphne and other food of this character. In the lake there should be placed wild rice and other plant life in such quantities that there can be no limitation to the number of little fish that can be fed.

Nearly all the lakes in Pennsylvania are either the property of the State or fishing is permitted by the persons owning the surrounding land. As the attractions of the lakes become more widely known, the number of persons who visit them become annually greater. A week's visit to one of these lakes and life in the open air sends back the visitor a far better person in every way than almost any other recreation that is known.

The lakes for the most part lie in depressions in the mountains, whose slopes rise proudly from the water embowered in trees and shrubbery or perhaps bright with the green of the grain or pastures. The waters are as clear as crystal and sparkle in the sun brighter than crown diamonds, while the whispering winds toss the waters in little wavelets which render even brighter the sparkle. To the average angler a few fish rewards the hours of fishing and from most of these lakes rewards come. It is the hope of the Department that with the co-operation of those interested that the lakes may once more be filled with food propagating plants while the efforts of the hatcheries may constantly add to the stock of the fish in the waters. Really, this question of food supply is the main one and if this can be kept up there is no question that the lakes will continue to yield abundance of fish to the angler, with this reservation, that the laws must be enforced against all destructive methods of fishing, whereby the greedy fishermen with nets and other murderous appliances destroy thousands of little fish in order that he may obtain a few large ones.

The value of these lakes as resorts cannot be measured in dollars and cents, for while the fish themselves do have a value yet there is

a far greater value for the people of the country who can get out on their banks and brighten their lives under the exhilaration of their surroundings.

In the Ohio basin there are also lakes, but they are not so numerous as in the northeastern section of the State. Conneaut Lake in Crawford county is the largest of all the lakes in the State, being six miles long and about a mile wide. In these western lakes, there are no pickerel, but instead we find the muscallonge and the yellow pike. To the enthusiastic angler, the thought of muscallonge always awakens a thrill, as they recall the fights with that large and gamey fish. These western lakes are becoming almost famous resorts and Conneaut Lake especially, thousands of people visit its shores every summer.

While the expert angler, who, with his elaborate tackle and gaudy flies, looks forward to a battle royal with the small mouth bass, the muscallonge, or the brilliant hued trout, there are hundreds, aye, thousands of boys and girls, or boys and girls of mature age, who look forward to the taking of the more humble fish of the lake with greater enthusiasm and more anticipated pleasure than the angler does to his sport. The taking of a string of yellow perch, sunfish or catfish is an event to be marked with a white stone, and the fisherman returns to camp or home waving his string of fish with yells of triumph, while round him gather his companions and friends to look on the string with as much enthusiasm as ever a Roman guard cast upon the Chaplet of a conqueror.

Besides, these lake fish afford a dainty morsel for the table. Few viands taste better to a hungry mortal than do the perch, sunfish and catfish. Indeed, in times gone by, there was a celebrated resort near Philadelphia, where the alluring temptation was held out to the diner of catfish and waffles. Speaking of catfish, one of the most devoted lovers of Izaak Walton, of Pennsylvania, a famous trout fisher, once remarked, "Did you ever eat a catfish from the cold waters of a trout stream? I just made the discovery a short time ago that no finer dish was ever set before a king, than such a catfish, and whenever one is ensnared upon my hook, I carefully place him upon my creel, where he may be taken out for my own delectation at the next morning's breakfast instead of the trout."

There is, however, a very decided commercial side in this matter of the lake country. The more visitors that visit the lakes the more money is brought into that section of the country, and it is a well known fact that a large part of the livelihood of many residents of Pike county is derived from the payments made by the summer visitors. The visitors must eat, and desire comforts and conveniences of various kinds for which they must invest money that remains in the section where they camp or locate. This is getting more thoroughly understood by the residents every year, and waters that have been closed to public fishing have been opened up so as to attract outsiders to the spot.

It is reported that in Maine, the amount of money spent by fishing amounts to millions of dollars annually, and there is no reason why the attractions of the lake regions of Pennsylvania should not be so increased that a very large revenue would be derived by the inhabitants of that section from the visitors from New York and other large

cities. Thus while the visitors are recuperating their health and enjoying the fishing, the residents of the section are also enjoying the feeling that they are increasing their bank accounts.

#### FINANCIAL STATEMENT.

The following shows the receipts and expenditures of the Department of Fisheries for the year ending November 30, 1912.

HATCHERIES		
Received from State Treasurer, .....	\$46,839 76	
Balance on hand Dec. 1, 1911, .....	594 78	
<hr/>		
Paid for hatcheries, .....		\$46,839 76
Balance on hand Nov. 30, 1912, .....		\$594 78
WARDENS.		
Received from State Treasurer, .....	\$12,100 66	
Balance on hand Dec. 1, 1911, .....	49 23	
		\$12,149 89
Paid for wardens, .....		\$12,100 66
Balance on hand Nov. 30, 1912, .....		49 23
CONTINGENT FUND.		
Received from State Treasurer, .....	1,000 00	
Balance on hand Nov. 30, 1911, .....	171 94	
		\$1,174 94
Paid for contingent expenses, .....		\$1,037 15
Balance on hand Nov. 30, 1912, .....		\$137 19
EXPENSES OF FISHERIES COMMISSION.		
Received from State Treasurer, .....	\$2,282 06	
Paid for expenses, .....		\$2,282 06
COUNSEL FEES AND COURT EXPENSES.		
Received from State Treasurer, .....	\$1,004 60	
Paid for expenses, .....		\$1,004 60
OPERATING COMMODORE PERRY.		
Received from State Treasurer, .....	\$4,433 98	
Paid for operating, .....		\$4,433 98
COMPLETING HATCHERIES.		
Received from State Treasurer, .....	\$5,555 22	
Paid for work, .....		\$5,555 22
FIELD WORK.		
Received from State Treasurer, .....	\$6,180 80	
Paid for work, .....		\$6,180 80

During the year there were receipts from the various sources as follows, the same being paid into the State Treasury daily in accordance with the statute:	
License fees for commercial hatcheries, .....	\$ 120 00
License fees for eel baskets, .....	408 05
License fees for shad seines, .....	30 90
Lake Erie licenses, .....	1,917 00
Confiscated fish and decoys sold, .....	.95
Fines for violation of the fish laws, .....	.612 87
License fees for tidewater seines, .....	20 00
	\$5,118 77

## REPORT OF THE

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ITEMIZED EXPENSES OF HATCHERIES.  
The following is the itemized account of the expenses of the various hatcheries for the year ending November 30, 1912.

Hatcheries.	Salaries.	Wages.	Travel.	Materials.	Food.	Incidentals.	Total.
Bellefonte, -----	\$3,310.00	\$846.20	\$1,397.03	\$2,155.82	\$1,357.59	488.50	\$9,555.14
Cory, -----	3,438.65	744.50	311.63	8,400.43	964.65	455.73	14,680.69
Crawford, -----	600.00	75.50	5.58	100.37	77.81	208.82	1,188.08
Erie, -----	1,607.50	415.42	133.78	1,000.01	111.67	61.55	2,218.25
Erie Auxiliary, -----	2,570.42	607.10	429.90	127.77	569.50	265.55	5,044.74
Spruce Creek, -----	805.00	40.50	239.90	318.18	653.28	102.35	2,136.17
Torresdale, -----	2,160.00	453.75	569.41	979.01	532.33	962.71	4,750.27
Wayne, -----	2,685.50	1,002.26				679.49	6,588.00
Total, -----	\$17,682.27	\$8,850.81	\$3,817.14	\$13,730.47	\$3,705.80	\$3,335.85	\$46,131.34

\*In the incidental expenses of Torresdale is included the item of \$388.32 for electric light.

No. 21.

## DEPARTMENT OF FISHERIES.

23

## COMMERCIAL FISH HATCHERIES.

The number of licenses issued for commercial fish hatcheries during the year was 13. The following is a statement of the business done by them:

Name.	Number.	Pounds.	Value.
Dead trout for market, -----	190,987	65,167	\$20,370.62
Trout, alive, mature, -----	154,812		7,070.92
Brook Trout, advanced fry, -----	132,000		568.00
Brook Trout, eyed eggs, -----	24,606,900		11,157.01
Brook Trout, green eggs, -----	1,400,000		345.00
Black bass, -----	4,000		80.00
Gold Fish, -----	12,378		323.00
Sunfish, bluegills, -----	7,500		226.50
Total, -----	26,516,577	65,167	\$40,141.05

## THE EEL INDUSTRY.

The year 1912 was rather an unfortunate one for the licensees of fish baskets as the catch was very small due to the fact that high water was the general rule during the season. By far the larger proportion of licensees in making their reports said that they could fish but a few times on account of high water or else their baskets were entirely washed away. Warden Shoemaker reports for the northern branch of the Susquehanna river, "This has been one of the seasons in this section of the State, that the fish basket people caught very few eels. Soon after the season opened there was a twelve foot flood which took out nearly all of the baskets. Again in the early part of September there was another 10 foot rise in the river, which again took out the baskets, leaving but very few baskets in the river. Again in October, there was a 12 1-2 foot flood, this only left 4 baskets in Wyoming County, and 5 or 6 in Bradford County, and these were practically destroyed, or so much so as to be practically useless."

The total catch of eels was 54,083, weighing 44,335 pounds, with a total value of \$4,536.34; 4,892 suckers and mullets were taken with a value of \$286.59 and the number of carp taken was very small, only 391 being reported with a value of \$70.40.

The following is an itemized statement of the catch:

## REPORT OF THE

Off. Doc.

Counties.	Eels.	Suckers and Mullets.			Carp.			Lenses issued.	Caught not hauled.
		Number.	Weight.	Value.	Number.	Weight.	Value.		
Adams, -	9	96	\$2.00		7	4	\$ .28		
Bedford, -	115	331	32.02		50	50	4.00		
Berks, -	9	21	4.20		74	57	3.30		
Blair, -								1	1
Bradford, -								52	8
Bucks, -								1	3
Cameron, -	31	25	3.50		12	7	.70		
Centre, -	457	533	58.30		13	10	.50		
Chester, -	12	16	1.60		749	578	50.71		
Clinton, -	1,239	821	11.25		4	3	.22		
Columbia, -	50	44	5.11		26	15	1.12		
Cumberland, -	1,590	955	37.73		137	81	4.00		
Dauphin, -	11,067	5,394	569.61		3	4	.06		
Franklin, -	49	84	8.40		32	24	2.40		
Huntingdon, -	1,545	980	83.68		10	4	.20		
Juniata, -	566	271	23.55					1	10
Lackawanna, -	1,300	1,050	104.00					10	12
Lancaster, -	10,175	6,712	646.55		2,672	2,637	168.80		
Lehigh, -								307	1,430
Luzerne, -	1,678	1,092	197.52		43	29	.20		
Lycoming, -	3,193	2,951	314.80		306	108	11.66		
Mifflin, -	8,275	3,496	536.76					3	21
Northumberland, -	4,661	4,928	449.17		200	152	11.91		
Perry, -	5,833	2,638	222.66		264	233	14.65		
Snyder, -	305	216	20.32		48	36	3.08		
Susquehanna, -	24	49	4.90						1
Tioga, -	382	764	14.40						5
Union, -	1,044	1,156	35.00		147	73	4.65		
Wyoming, -	952	600	115.90		65	58	2.05		
York, -			64.30		26	16	1.10		
Total, -	54,683	44,235	\$4,536.34		4,892	4,266	\$386.60		
								391	1,582
									\$70.40
								409	.58

No. 21.

## DEPARTMENT OF FISHERIES.

## DISTRIBUTION OF FISH.

The decision of the Department to distribute yearling fish instead of the smaller ones, except in the case of such fish as pike-perch, white fish and lake herring, seems to meet with general approbation, as is shown by the many letters received at the Department, as with the exception of a few, all are endorsers of this policy.

In order to more fully get at the condition in which the fish are received, the Department has adopted a plan of sending with each notice of shipment a blank on which is noted the number of fish reported sent, and the recipient of the fish is asked to return this blank with a statement as to the number of fish he actually received and the condition in which the fish were when planted.

The plan seems to work out very well and the Department is thus enabled to be sure that the persons who applied for the fish received them. It is also a guarantee as to the number of fish actually distributed and planted. Of the large number of replies sent in during the year by recipients of fish, it is almost invariably the case that the recipients report the fish as received in the best condition, with losses hardly more than from five to ten fish, and in most instances the recipient adds the fish could not have been in finer or better condition.

While the number of fish distributed during the year is not so large as in previous years, this can be ascribed to the fact that the propagation of fish was interfered with by the work of permanently building up the hatcheries, and also from the fact that in regard to the lake fishes the weather conditions were extremely unfavorable. With the completion of the permanent structures at the hatcheries it is hoped that in another year the distribution of fish may equal any figures shown in the past.

## SHAD SEINE LICENSES.

During the year 16 licenses were issued under the act of May 1, 1909, with its supplement, for seines for the taking of shad, herring or alewife, from March 1, to June 20, of each year. Under the provisions of the Act any food fish taken in these seines during the lawful season can be kept. There were 23,340 shad taken with a value of \$5,079.60. The other food fish taken were valued at \$81.78.

It will be noticed that no fish were taken in the Susquehanna river above the dam of the Pennsylvania Power & Water Company at Holtwood. The shad fishing below this dam was extremely good and many persons availed themselves of the opportunity using dip nets and from such fishermen no reports could be obtained, but the number of fish undoubtedly ran into many thousands.

The shad fishing on the Delaware river was very good and the prices obtained made the catches profitable to the fishermen. The

report of the Superintendent of the Torresdale hatchery shows that the take of eggs which were obtained from the fishermen was a record one. The following is the table of the take of fish under the seine licenses for the inland waters of the State:

County.	No. of license.	Shad.		Carp.		Suckers and Mullets.		Rock Bass
		Number.	Value.	Pounds.	Value.	Pounds.	Value.	
Dauphin, -----	1			151	\$9 88	81	\$3 40	
Lancaster, -----	6	18,416	\$2,868 35	30	1 50			\$2 50
Mifflin, -----	5			740	87 00	65	5 50	
Perry, -----	1			290	10 00			
York, -----	3	9,934	\$2,211 25	250	12 50			
Total, -----	16	23,340	\$5,079 60	1,371	\$70 38	146	\$8 90	\$3 50

#### CRAWFORD COUNTY HATCHERY.

Last year the Commissioner and the Board of Fishery Commission were unanimously of the opinion that the Crawford County hatchery at Conneaut Lake was not fitted for the purpose. The water supply is inadequate, and the outlet of the lake, which is dammed to furnish the water, cannot be raised any higher without securing the properties above, as they would be flooded and only then about an additional depth of two feet of water could be obtained. It is also impossible, owing to the character of the grounds to drain the ponds and the ponds cannot be satisfactorily worked unless they can be drained.

The water supply for the battery was known to have failed several times causing loss and trouble, and there is no method except to put in a pump which would be a constant source of expense that would eliminate this risk of failure of the supply at a critical moment. In view of all these conditions it seemed very poor policy to expend any more money at the Crawford hatchery, but to devote that money to the completion and facilities of the other hatcheries where there is room if the facilities are added, for supplying all the fish needed in the Commonwealth for some years to come.

There were numerous protests filed by residents of that section of the State against the abandonment of the hatchery, but these came from persons who the Department is sure had not made themselves fully acquainted with the situation. Some of these protests claimed that the muscallonge fishing had been greatly improved in Conneaut Lake since the establishment of the hatchery, yet as a matter of fact no muscallonge were hatched at the hatchery at Conneaut Lake. It can be a matter of no importance to any one if

he gets his fish, where the fish were hatched, but it is important to the Department in an economical and other points of view, that the fish be hatched where it can be done most economically and effectively.

The Department was able to obtain 500,000 muscallonge eggs from the New York Conservation Commission, which eggs were hatched at the Union City hatchery, and 50,000 of them planted in Conneaut Lake. This supply it hopes to keep up annually, supplementing it with other fish until Conneaut Lake is made one of the best fishing resorts in the State. There are unquestionably large numbers of fish now in Conneaut Lake, but experience has shown that where the waters of a lake are shaken up by motor boats that fishing is badly interfered with.

When it was decided to abandon the hatchery at Conneaut Lake, the Department promised the protestants that it would supplement its views with the opinion of at least two well known fish culturists. At a meeting of the American Fisheries Society, at Denver, Colorado, in September, the Department was able to secure the promise from two of the leading fish culturists of the country, Mr. Dwight Lydell, Assistant Superintendent of the Michigan Fish Commission, and Mr. James Nevin, Superintendent of the Commissioners of Fisheries of the State of Wisconsin, both of whom have a national reputation as fish culturists, Mr. Lydell, especially, as a propagator of small mouth bass, in which he has been the most successful culturist in the United States. These gentlemen in response to their promise, visited the hatchery, and their reports are subjoined. It will be observed that the reports entirely confirm the judgment of the Department.

#### REPORT OF MR. DWIGHT LYDELL.

Comstock Park, Mich., September 24, 1912.

Mr. Nathan R. Buller, State Fish Commissioner, Harrisburg, Pa.

Dear Sir: As per your request, while at Denver, Colo., I have visited your Fish Hatchery Station, at Conneaut, Pa., and beg to make the following report in regard to the possibilities of the station:

After thoroughly looking over the station, would consider it a very poor location for a pond station. The work that has already been done there shows lack of knowledge in regard to fish hatchery construction and of very little value to the State should the station be continued.

One great drawback is no elevation. The water head is nearly on a level with what should be the lowest pond level. The location is such if ponds are dug to a depth to insure success in pond culture they cannot be drained. To be successful as a bass station ponds should have at least 5 feet of water in the kettle or deepest part to afford a retreat for the large fish in the summer months and a natural place for them to winter in.

There is not elevation enough to give any aeration from one pond

to another, which is one of the main factors in pond culture. Where the water is used over and over at least 6 inch fall should be had from one pond to another.

I also understand that during some of the dry seasons not much water flows from the outlet of Conneaut Lake, which is a great drawback, as warm, dry seasons is when the largest supply of water is needed. Possibly a station with 5 or 6 ponds could be successfully operated, provided a pipe line were laid to tap Conneaut Lake, thereby giving about 2 feet head of water above what you already have. This, however, would necessitate the outlay of considerable money, and then, as no great amount of spring water is available, you would be limited as to the number of ponds you could build and the varieties of fish you could handle.

During the last few years there seems to be more fishermen, and with their automobiles they are able to reach the lakes and streams that hardly ever before were fished except by natives. This means, that more fish and more varieties must be provided. Instead of having a lot of small hatcheries scattered throughout the State, it is far better and less expensive, to have a few large plants so located that several varieties of fish may be propagated and distributed from the one central point.

Very truly yours,  
DWIGHT LYDELL,  
Assistant Superintendent Michigan Fish Commission.

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REPORT OF MR. JAMES NEVIN.

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Madison, Wisconsin, October 12, 1912.

Hon. N. R. Buller, Harrisburg, Pa.

Dear Sir: Having complied with your request to examine the State Fish Hatchery at Conneaut Lake, I herewith submit to you my report as to whether or not the location was adapted for a bass hatchery, and also for the propagation of white fish and pike eggs.

From the amount of water that was running in the rivulet on the eighth of October (after all the rains we have had during the past season), it is impossible to get enough water into the hatchery to run the jars for the propagation of white fish and pike-perch fry.

The idea of building a fish hatchery for the propagation of white fish about forty miles inland from Lake Erie, where the expense is so great in getting the fish to the lake ports after hatching.

In regard to the propagation of bass, this place might be made available for that purpose, if there was a 16 inch pipe to carry the water for a mile or more from Conneaut Lake to the hatchery site. If during the season there happened to be a drought, it is doubtful as there is only a two foot fall from the lake to the hatchery, whether there would be water at all times to supply the hatchery ponds, for the evaporation would take up all the surplus water. Now, if you attempt to build a dam on the hatchery property in order to raise the water, you would be liable for damages for overflowing the land

of other parties' property. Therefore, on account of having an insufficient supply of water to run the hatchery and supply the ponds, the place is not suitable for the propagation of fish.

With the President of our Board, about five years ago, I had the pleasure of visiting some of your State hatcheries. Both he and myself thought that the several buildings, the construction of the ponds and the manner in which they were kept, was a disgrace to the great State of Pennsylvania. To think that they have been hatching fish for the past thirty years and have not advanced any during that time (the buildings and construction work being done at that time was similar to that built thirty years previous, when fish culture was in its infancy).

On my recent visit to the Corry hatchery, I was more than pleased to see that Mr. N. R. Buller, the present Commissioner, was not going to remain in that old rut. He, on the other hand, was remodelling things and making them according to present day methods in the construction of fish hatcheries.

Yours truly,  
(Signed) JAMES NEVIN,  
Superintendent.

The property on which the hatchery is situated was purchased by subscriptions of a number of citizens of Meadville and vicinity and by them donated to the State for fish hatchery purposes. As is shown above, the property is not suitable for hatchery purposes, and it is recommended that the property be sold and the money advanced by the original subscribers to the fund to purchase the property, be returned to them with interest.

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FISHWAYS.

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The question of fishways has been the subject of much study by the Department of Fisheries. Under a decision of the court of Dauphin county permitting the erection of the dam in the Susquehanna river at McCall's Ferry, the court made a proviso that the Power Company must place in the dam a fishway which will be satisfactory to the Department of Fisheries. A fishway of the Cail pattern was placed in the dam, but it has proven entirely inadequate for the work. In the first place, it is too small, and in the second the entrance to the fishway from below the dam, is too far from the dam, being several hundred feet below the breast.

The shad and eels ascend the river to the dam and vainly try to scale it, but they have not sufficient instinct to then descend the river several hundred feet to the mouth of the fishway. This is a fatal defect, and even if the fishway were commodious enough it would require some kind of a dam or a screen at the mouth which would prevent the fish from ascending further up the stream and guide them to the mouth of the fishway.

During the past season the Department assigned Warden C. R. Holland to patrol at the dam and study the fishway, and the following is his report:

McCalls Ferry, July 10, 1912.

Honorable N. R. Buller, Commissioner of Fisheries.

Sir: I have the honor to report that March 22, 1912, I went to the power plant at this place in company with yourself and Commissioners John Hamberger, Henry C. Cox, and W. A. Leisenring, and was placed in charge of the shad fishing from the dam of the Pennsylvania Water & Power Company at this place to the Maryland line, S. S. Grove, a special warden, being detailed to assist me.

As the ice was going out there was nothing to be done then and I returned home and went back to McCall's Ferry April 9th. The first shad were caught at Peach Bottom April 25th and at the dam May 3d.

May 10th I had the water in the fishway in the Power Company's dam shut off, and found no fish of any kind in the fishway. May 20th I again had the water drawn off and found four German carp a third of the way from the top of the fishway and they were badly battered by their struggles in the fishway. No other fish of any kind were there. The carp came through from the river above the dam as I had seen them for three days before the water was shut off. At this time thousands of little eels were trying to get up the fishway, but could not ascend it on account of the swift current of the water.

During May and June the shad were caught by the thousands and the fishermen said that they were never so good. The prices were from \$25.00 to \$60.00 per hundred.

The removal of the four hundred foot limit which had previously existed as to fishing below the dam gave great satisfaction and no illegal fishing was done.

You visited the Power Plant June 20th, the closing day of the shad fishing season and had the water in the fishway shut off when five carp were found near the head. No other fish were discovered in the fishway. Going to the York County side you observed the shad trying to get up the pools towards the breast of the dam and saw thousands of little eels crawling up the damp rocks 200 feet from the river. You again visited the Power Plant June 28th in company with Mr. W. E. Bennett, the consulting engineer of the Power Plant. In company with you and Mr. Cannon we went to the York county side, where after examining the ground and the dam you directed the engineers that the Power Company must at once start plans for a new fishway on that side, and Mr. Bennett ordered Mr. Cannon to start the survey and plans at once. June 23rd the Power Company placed planks on the breast of the dam for the purpose of raising the water five feet, but enough water went through the planking to keep the river where the shad were spawning fairly fresh.

June 10th the shad having all spawned, and returned to the sea, by your orders I returned to my district.

From the results of my examination I am sure that the present fishway is of no value, but a fishway should be placed on the York County side as that is where the fish ascend the stream.

Respectfully,  
C. R. HOLLAND,  
Fish Warden.

An examination of the topography at McCall's Ferry dam and a study of the channels by which the fish ascend shows that the greater part of the migration of the shad and eels is on the York county side, and that it is possible to establish a series of pools from the dam down to the river, by which the fish can ascend up over the dam. It is possible that it will be necessary to put a secondary dam at the mouth of the fishway to keep the fish from passing the opening. The engineers of the Power Company have been engaged in surveying the grounds and are expected to report on the feasibility of the plan at an early date.

At a recent meeting in September at Denver of the American Fisheries Society, the members of which are composed of the leading fish culturists of the United States, the question of fishways was thoroughly discussed and all the papers read, and the discussion showed that up to the present time it is the concensus of opinion that no fishways have been installed in eastern waters that are at all practical.

The fishways recommended by the United States Bureau of Fisheries is a plan known as the Cail system, but from letters received from the Bureau it is evident that the officials are not satisfied with its efficiency, as they have several times written to this Department to know if it has any evidence that the fish have actually used the fishway that they recommended. The trouble with this fishway, as mentioned above, is that the entrance on the lower side is entirely too far away from the breast of the dam. Taking a dam, for instance, of only fifteen feet in height, which is low in these days, the mouth of the fishway is from 60 to 75 feet from the dam.

It is therefore, evident that the fish cannot find this except possibly in rare instances. To be practical, the fish would have to be prevented in some way from getting past the mouth of the fishway, which would necessitate a dam or a screen, and this would have to be strong enough to withstand the assaults of ice and trash. To be effective the mouth of the fishway should be exactly at the breast of the dam so that when the fish are feeling their way along the dam they will come to the mouth of the fishway. In case of trout, it would only be necessary to have a few steps, so to speak, by which the trout could easily ascend.

With the exception of shad and eels, there are really no migratory fish in the Commonwealth of Pennsylvania, and the dams really are a great benefit to the fishermen by creating more and larger areas of water in which the native fish of Pennsylvania thrive, but the law that stands upon the statute book today, however, requires that all persons or corporations, owning or maintaining dams, shall erect such chutes, slopes, fishways, gates or other devices, as the Board of Fishery Commission may decide necessary to enable the fish to ascend and descend the waters at all seasons of the year. So long as

these provisions remain on the statute book, it is the duty of the Department to see that such fishways are put in and as soon as it is convinced of a practical method, why, of course, such method will be installed.

There are a large number of dams in Pennsylvania in small streams where the supply of water is only equal to the operation of the mill connected with it during the hours of daylight, and it is absolutely necessary to close down during the night so that the water supply can again accumulate. To place fishways in such dams would be to, in many places, destroy the usefulness of the dam to the mill operator.

There are also being erected throughout the State a large number of dams for the conservation of the water supply, either for supplying water for municipalities, for manufacturing purposes, or for supplying the motive power of the railroads with water. The conditions are such that all the water, except in time of high water, must be conserved, and the placing of a fishway would mean a waste. The law, however, means in its wording, evidently to give a discretion to the Board of Fishery Commission in this matter, as it says after speaking of devices, "as the Board of Fishery Commission may decide necessary." Under the circumstances described above, and the absence of migratory fish, it would seem that the Board might decide that no device is necessary.

Except in the case of water supply for municipalities which must be kept pure, the owners of the dams generally allow fishing and the fishing is much better for the locality than it was before the dams were erected owing to the greater quantity of water. Here, as in the case of the minor little dams spoken of, the fishway would mean a waste and a deterioration of the supply of water.

Another fact has been recently called to the attention of the Department, and that is a defect in the wording of the law, if the fishway is to be always effective. The law reads, "that the chutes and other devices may be closed for repair, or in time of low water, but such closing shall be only for a period of thirty days at any one time."

The Department learns that in some cases the operator of the dam to conserve his power, opens his fishway for 24 hours and then recloses it for thirty days, so that the fishway is really only in use 12 days in a year. Technically this is in exact compliance with the law as it is written on the statute book, but far from coming up to its spirit.

#### WARDEN SERVICE.

The question of enforcing the fish laws carries also with it the problem of so securing the good will of the public that the result will be a general sentiment in favor of enforcing the laws. Experience has shown that the best work is secured by having a force of salaried wardens trained in their work and anxious, rather to prevent violations of the law, than to pile up arrests and fines. The effort of

the law to make constables active fish wardens, as mentioned above, has been almost a total failure. The experiment of wardens who were paid fees was wrong in principle and much of the opposition to the work of the Department was chargeable to it. Men who must pay their own expenses and depend upon the fees they earn by securing convictions would naturally follow the lines of least resistance, and seek those convictions that could be most easily made, regardless of the fact whether the offenders prosecuted were those who most deserved to be punished. The result was that many persons were arrested and fined who were but slight or careless offenders, in many cases the offenses being merely technical, and in the interest of securing the good will of the people in the rural communities, ought to have been treated leniently and perhaps not prosecuted, while the real fish pirates did practice the business of violating the laws, much as do professional burglars and thieves and consequently hard to apprehend, were often not punished at all.

The paid warden has no incentive to secure a conviction merely to increase his earnings, as now, under the law, no part of a fine goes to the prosecutor, except that in the case of constables. Under the law, a constable is entitled to ten dollars for each conviction he secures for violation of the fish law. This law has been declared perfectly sound by the court of Wayne County as being in the line of legislation which pays a constable by fees. The ten dollars reward, however, has not proven any incentive for a constable to do his duty. The regular warden, while intent on pursuing the hardened fish hog, exercises tact and discretion and knows that a record of arrests stands him in no better stead on the records of the Department, than the fact that his district is clear of violations due to his watchfulness and care.

While the act of 1909 authorizes the appointment of thirty wardens, unfortunately, the appropriation made for the support of the wardens allows only the appointment of nine for the whole term. This gives each warden from seven to eight counties, which is not only too large a territory for him to cover, but largely increases his traveling expenses from the necessity of making long trips.

Another trouble is that the warden cannot do his full duty by traveling by train or wagon, because his work should be patrolling the streams. However, the Department is glad to say that the work accomplished by its wardens during the past year has been extremely commendable, and in many communities, has brought about an entire change of sentiment in regard to the law, the majority of people favoring fish protection in an earnest way, where formerly if they had any sympathy at all, it was with the violators.

Thanks to the courtesy of Major John C. Groome, Superintendent of the State Police, the work of the Department has been greatly supplemented by details from his force. For several months a detail was maintained at Harrisburg, which thoroughly patrolled the various counties about the Capitol and undoubtedly did much good work in deterring would-be violators.

The Department feels that its work is the propagation of fish and the stocking of streams and that the work of enforcing the laws in regard to protection should be placed in the hands of the police force of the Commonwealth. This would relieve the Department of a very

heavy burden and would also relieve it of some of the odium which will be experienced by it by the arrest of violators. Whether this could be attained by increasing the State Police force or by placing the warden force of the Department under the control of the Superintendent of Police is a question for the wisdom of the Legislature.

While hampered by the smallness of the force of wardens, the Department has strenuously endeavored through the year to have all complaints examined, even sometimes if they were anonymous, but bearing an evidence of good faith or where the Department had suspicions that there were violations of the law. There has been a strong disinclination on the part of the public to appear against a neighbor for violation of the law, but the Department is glad to find that as the better class of citizens no longer violate the law through carelessness or thoughtlessness, there is more of a disposition to help the warden prosecute the persistent violator. It is a well known fact that no law can be effective unless it is supported by a majority of the community, and this is the state of feeling that the Department is earnestly trying to bring about. In some cases where complaints have been examined it has been found that they are brought by personal feelings and an effort made to use the Department as a means of revenge, but these cases have all failed through the tact and discretion of the wardens.

The wardens have been kept busy in the matter of pollution and in every case where the matter has been called to their attention, either by notice or by observation, they have notified the manufacturer that the pollution must cease. It is gratifying to say that with the exception of a very few cases they have received the most courteous treatment from the operators and have been assured that the operators are desirous of co-operating in the matter. While the smallness of the appropriation, as mentioned above, has prevented a multiplication of suits, these notices will serve in the future in case strenuous measures must be taken to show that the manufacturers are fully aware of the law through having received these notices.

The real purpose of the Department of Fisheries is to propagate fish and plant them in the streams so that the supply of fish in the waters of the Commonwealth be kept equal to the demand upon them. The propagation of fish demands skilled and trained men in their line and to secure the best results all the energies of the head of the Department should be devoted to that end.

To the duties of propagating fish, the Legislature in its wisdom, has added the charge of enforcing the laws in regard to fish by means of fish wardens. A fish warden, to be thoroughly competent, should be a man in the best physical condition, capable of withstanding the hardships of storm and the wear and tear of sleepless hours, because most of the violators of the fish laws, or rather the real violators of the fish law, work like thieves, in the darkness of the night. To catch these violators it is necessary to patrol the streams where progress is difficult and tiresome, and hours cannot be counted as they are counted by the ordinary laborer.

To this physical ability must be added a mental training which will enable the warden to grasp the meaning of the laws, to know what their enforcement means, and to be able to take a case before a justice of the peace, see that the law in regard to such trials is fully

carried out and that the justice's docket will stand the scrutiny of a higher court. This requires higher mentality than is usually possessed by the ordinary justice of the peace, for in 99 cases out of 100, the docket of an ordinary justice falls completely when taken before a court of record on certiorari. In the enforcement of the law there arises constantly cases which awaken the hostility of the neighborhood, no matter what the merit of the case is in the eyes of the law, and this disfavor is visited upon the Department of Fisheries.

Pennsylvania at this time possesses a body of men known as the State Police whose duty is to enforce the laws, and from every point of view it seems that the proper thing to be done would be to divorce the Department of Fisheries from the enforcement of the laws and turn its warden services over to the Superintendent of the State Police.

The care of the warden service necessarily devolves a lot of work upon the Department of Fisheries that is entirely foreign and apart from the propagation of fish. It is work that should be done by such trained men as sit in the office of the Superintendent of Police. If the Department should be relieved of its warden service it could then devote all its time and energy to the main purpose of its existence.

There is no question that if the warden service were detached from the Department of Fisheries that there would be less friction between the Department and the public and a better feeling could be created. The Department could then devote all its energies, as I remarked before, to the propagation of fish and to the dissemination of knowledge of fish and their habitats among the people. If this knowledge could be universally disseminated there is no question that it would greatly aid the Department in its work of restocking the streams. A mistake of one warden, no matter how trivial, will often excite the animosity of a whole community, and it will take a long time to overcome this animosity.

I am glad to say that the present force of wardens have made very few errors of judgment, but it is not always from an error of judgment that the animosity is created. The Department believes that the enforcement of the laws should be placed in such a body as the State Police whose duty and training fits them pre-eminently for the purpose, and the Department of Fisheries only has to exercise its training and supervision over the men who will raise the fish and supervise the planting.

#### VIOLATIONS OF FISH LAW.

The number of arrests made from December 1, 1911, to November 30, 1912, 157.

Amount of fines collected for violations of the fish laws. \$2,612.87.

The Department is glad to say that there was an apparent falling off in the violations of the fish laws owing to the increased public sentiment for the protection of fish.

The following is the nature of the violations:

Dynamiting fish, .....	15
Fishing with gill net, .....	3
Fishing with seine net, .....	8
Fishing illegal dip nets, .....	13
Fishing with nets in trout streams, .....	9
Fishing with spears in trout streams, .....	11
Taking short trout, .....	14
Taking short bass, .....	4
Taking short pickerel, .....	4
Taking game fish out of season, .....	12
Fishing with trammel nets, .....	1
Fishing with lay-out lines, .....	14
Snares fish, .....	1
Taking fish with the hands, .....	2
Fishing nets within 400 feet of dams, .....	2
Fishing on Sunday, .....	22
Illegal fish basket, .....	9
Using illegal devices not specified, .....	6
Illegal set nets, .....	2
Nets without license, .....	5
Total, .....	157

#### MUSCALLONGE.

By an arrangement with the New York Conservation Commission the Department was enabled to obtain during the year a supply of five hundred thousand muscallonge eggs which were hatched at the station at Union City in Erie County. The hatch was very successful, the loss being very small, and the muscallonge were planted in Lake Erie, Conneaut Lake, and two or three other lakes in the western part of the State where they had previously existed.

The muscallonge is a native of the Great Lakes and, as said above, in a few lakes in western Pennsylvania, and it is not abundant anywhere as is shown by the catch. This is probably due to the fact that it is a marauder and extremely voracious, Jordan and Evermann saying, that "eighty pounds of muscallonge represents several tons of minnows, white fish and the like." It sometimes reaches a length of eight feet with a weight of over one hundred pounds. To take a muscallonge is regarded by the angler as one of the most exciting of sports. It is a tremendous fighter and tries the skill of the most expert angler, but nevertheless, one feels that the admiration for it in the eyes of the sportsman is due more to its enormous size than anything else. It ranks very high as an edible fish, but in many

ways, owing to its voracity, it is not a desirable fish to put in waters in which it is not native, as one fish with its enormous appetite, would require a very extensive area of water to supply that appetite.

The fifty thousand planted this year in Conneaut Lake ought to make the muscallonge fishing in that lake extremely good in a short time. That they grow with great rapidity is shown by the fact that a few of them which escaped into the pond at Union City were caught only four or five months later and were found to be eight inches in length.

#### LAKE TROUT.

The lake trout is the largest of all the trouts, reaching a length of several feet and a weight of from sixty to one hundred and twenty-five pounds. The average weight, however, does not probably exceed fifteen to twenty pounds. As an edible fish it ranks with the salmon and the brook trout itself. Under heavy fishing the lake trout in Lake Erie has been much decreased in spite of the efforts of the United States Government and the Department of Fisheries of Pennsylvania to keep up the supply. It has been difficult to obtain eggs and the number of eggs produced by these fish is not large, the usual number taken from one fish being from five to six thousand.

Owing to unfavorable weather conditions, and other causes, the Department was only able to obtain from Lake Erie for this year's planting about 100,000 eggs, but fortunately it was able to supplement this by exchanges with the Fish Departments of Michigan and Wisconsin, who kindly agreed to exchange, and from each of these Departments there was obtained 500,000 lake trout eggs. These were obtained in good condition, and after having hatched, the fish were planted in Lake Erie, and other lakes in the Commonwealth in which lake trout had formerly been planted.

Anglers do not regard lake trout as affording much sport, as they are deep water fish and must be taken by trolling. Though making not much of a fight, they require strong tackle to land them owing to their size and weight.

#### REMOVING CARP.

During the past year a number of complaints were received of the tremendous increase of carp in Presque Isle Bay at Erie and many requests that permission be allowed to take out these fish as injurious to the game fishes, while at the same time the fish could be marketed. Acting under the provisions of section 3 of the act of April 4, 1907, the Department issued 21 licenses for the use of gill nets having a mesh not less than five and one half inches for the removal of these carp. The licensees reported a catch of 117,711 pounds which they disposed of at one and one-half cents per pound, making a total value of \$1,765.67.

REPORT OF THE  
CO-OPERATIVE WORK.

Off. Doc.

During the year the Department has enjoyed the heartiest co-operation with the officials of the United States Bureau of Fisheries in the work of taking fish from the lakes. The Department has also had extremely pleasant relations with the New York Conservation Commission, the Michigan Fish Commission, and the Wisconsin Fish Commission, and by this co-operation it has been enabled in exchange to secure a number of valuable fish, which at the same time introduced new blood into the State. It is hoped and expected that these pleasant relations will continue to the advantage of all parties concerned.

DISTRIBUTION OF FISH.

The following is the distribution of fish during the year:

Calico Bass, .....	78
Rock Bass, .....	100
Small Mouth Bass—Yearling, .....	2,850
Small Mouth Bass—Adults, .....	217
Large Mouth Bass—Fingerlings, .....	732
Large Mouth Bass—Adults, .....	1,068
Cattfish—Fingerlings, .....	34,050
Frogs, .....	26,250
Gold Fish—Adults, .....	90
Lake Herring, .....	5,600,000
Muscallonge, .....	480,000
Pike Perch, .....	30,010,000
Yellow Perch—Adults, .....	662
Brook Trout—Yearlings, .....	222,745
Brook Trout—Advanced Fry, .....	15,000
German Brown Trout—Yearlings, .....	2,525
German Brown Trout—Adults, .....	2,600
Rainbow Trout—Adults, .....	2,750
Lake Trout—Fingerlings, .....	330,000
Yellow Perch—Fingerlings, .....	22,920
Yellow Perch—Yearlings, .....	975
Yellow Perch—Fry, .....	59,750,000
Blue Pike, .....	2,000,000
Sunfish—Blugills—Adults, .....	2,534
Sunfish—Blugills—Yearlings, .....	700
Sunfish—Fingerlings, .....	37,199
Sturgeon, .....	6
Shad Fry, .....	26,500,000
White Fish, .....	3,340,000
White Suckers—Fry, .....	100,000
Varieties of fish for Philadelphia Aquarium, .....	30
Total, .....	128,486,081

No. 21.

DEPARTMENT OF FISHERIES.

39

WORK AT THE HATCHERIES.

During the year it has been kept constantly in view the necessity of doing all work of a permanent character. Engineers were secured who plotted out the grounds at Corry, Bellefonte and Wayne hatcheries and elaborated a system of ponds which would utilize all the available space and conserve the water supply. Of course this work of rehabilitation was limited by the amount of money on hand, but the Department has the feeling that what has been accomplished has been well done, and that when the proposed plans are all completed the State will have hatcheries second to none as to their substantial character and to their adaptability for the work they are to do. It is hoped that the next Legislature will continue the appropriations for completion so it will not be long until the State has its hatcheries in a condition worthy of this great Commonwealth.

It is designed also, while making the hatcheries equal to the work they are to do, to also make them places of beauty which will attract the eye of the public and make them pleasant resorts as public parks, where at the same time the people of the State can learn the mysteries of fish culture with which knowledge they will be inspired with a desire to aid the Department in every way possible.

At Corry two series of ponds have been completed. They are built of reinforced concrete in the most substantial manner and at the same time are attractive to the eye. The result is that there will be much less labor for the employes at that hatchery as the ponds are much easier cleaned and kept clean. This series of ponds will be followed until all the ground available is occupied, it being proposed to have about 100 ponds, which will take care of all the trout needed for the territory that hatchery supplies for a number of years. The natural surroundings at the hatchery at Corry make it possible to be converted into a perfect beauty spot with trees, plants and flowers.

The Wayne hatchery is situated on the Lackawaxen river in Wayne county and within a short distance of it are a number of those beautiful lakes which dot that section of Pennsylvania. This makes Wayne county hatchery one of the most important in the State, not only for its facilities on the hatchery grounds proper, but from the possibility of using the lakes for the gathering and breeding of fish, such as bass, pickerel, yellow perch and frogs.

The Beaver Meadow Reservoir has been secured under lease and gives about 200 acres of water. This assures a continuous flow of water for the hatchery grounds and also a place for breeding bass. Experience has shown that bass culture can only be successful with large areas of water.

During the year two large bass ponds of three acres each have been constructed and finished. Stone walls have been erected upon both sides of the Lackawaxen from the head of the property to below the hatching house, a distance of half a mile. Two concrete dams have been built in the stream and it is proposed to build more. These dams are about two feet in height and then the ground is graded off to the level of the bed of the creek and carried back to make a pond, these dams thus affording feeding places for a series of ponds. Stone walls have also been erected for four shipping pools 60 by 12 feet.

The dwelling house was in an exceedingly bad condition, the floors on the first floor being so decayed that they threatened to fall into the cellar. The building, therefore, has been entirely remodeled and had an addition built to it so that it now contains 21 rooms. As the Wayne hatchery will be the main center for the field work this remodeling the house gives ample room for the boarding and lodging of the men who are necessarily employed during the field work season, a want that was badly needed.

There is hardly any limit to the number of fish that can be gathered at the field work provided the funds are available. The lakes in Wayne and Susquehanna counties could be made to teem with fish and would afford a supply for the whole State, if properly attended to. It is proposed to add two more additional ponds of an area of two acres each for the cultivation of bass. A new hatching house is needed for the hatching of yellow perch and pike-perch eggs gathered from the field. This house should be built of brick, stone or concrete and be of the most permanent character.

While the facilities for trout work are somewhat limited, yet it will be possible to propagate enough trout to furnish all the counties in the northeastern part of the State.

At Bellefonte the water in the upper series of ponds was obtained from the open stream which was constantly in a roily stage from the drainage of the cultivated grounds. The result was that the employes of the hatchery, or the public, could not see the fish and this was a detriment in case of the employes. The work of keeping the ponds clean was also greatly increased by this fact as the sediment settled from the water.

During the year a 10 inch pipe line was laid from the Blue Springs to the ponds, the result being that the ponds are now cleared up and from the clearance of the water the fish can always be seen, while as there is no filth in the water the labor of cleaning up the ponds is very much lessened. The 12 concrete ponds along Hatching House No. 1 were repaired with reinforced concrete. It is proposed to concrete all the ponds at the hatchery, the ponds to be laid out according to the plan drawn by the engineer. When these are completed they will carry a million year old trout.

Hatching House No. 1 is a frame structure and is in such a state of dilapidation that it should be replaced by a new one which new one should be built of brick or concrete with the troughs also of concrete so that there is no further possibility of decay. It should also be heated by steam to make it comfortable for the men in the winter time when the greater part of the work is done.

At Torresdale, the Department is proud to say, the greatest shad record was made during the year, there being 26,500,000 shad hatched there, all of which were planted in the Delaware river. Two million shad eggs were given to the New York Conservation Commission in exchange for 500,000 muscallonge eggs and 30,000,000 pike-perch eggs. Practically all the catfish distributed throughout the State during the year were propagated at the Torresdale hatchery and very many blue gill sunfish were also propagated. The Torresdale hatchery is best fitted for the propagation of catfish and blue gills, and it is therefore proposed to use it for that purpose and also for shad work.

As announced in the last report, it is the intention of the Department to devote each hatchery to the cultivation of those fish for which it is best suited as it is thought that better results will be obtained in this way than by any other.

The battery house at Torresdale has been heretofore supplied with water by means of a steam pump. This involved a heavy expense for coal and men to run the engine. During the year the Department has been able to arrange with the city of Philadelphia to have a pipe line laid from the Torresdale plant which will furnish water for the battery and do away with the pumps. A new concrete tank 30 feet in diameter will have to be built for the storing of this water. A new hatching house is badly needed and it is proposed to build it of a permanent character with brick or cement.

The proposed new boulevard will be extended by the city through the hatchery grounds, and it is therefore suggested that the buildings on the grounds be of such a character as to reflect credit upon the State and not be eye sores to the persons using the boulevard. It is therefore proposed to erect a new boat house for the storing of the boats and a permanent pier for the landing of the boats, the present pier being a ramshackle affair that is far from safe and very much of an eye sore. The Torresdale hatchery is being made a beautiful spot and its proximity to Philadelphia makes it desirable that all its capabilities should be brought out.

A new motor boat of larger size is badly needed for use during the shad taking season, and I suggest an appropriation for that purpose.

At Union City a new pond of two acres was built as a rearing pond for bass. This hatchery is not only fitted for the rearing of bass, but its nearness to Lake Erie gives it facilities for obtaining breeding bass from the lake just before the spawning season and after the fish have spawned the bass can be returned to the lake. The water supply to the battery house being insufficient a new four inch pipe line was laid from the head of the property to supplement the present means of supply. This hatchery was built as an auxiliary to the Erie hatchery for the hatching of the lake fish and the rearing of the small mouth bass and blue gills. During the past year its usefulness was shown more than ever from the fact that most of the work of the Erie hatchery had to be done here owing to the character of the Erie water.

At Erie practically no work was done, except the gathering of the eggs and the planting of the fish, owing to the fact that the Erie water having to be treated under orders of the Department of Health, would no longer do for the eggs and they had to be shipped to Union City. The last Legislature appropriated \$7000 for the erection of a new hatchery on the hatchery grounds, but as the water is now treated, these grounds are not available as a site because there would be no water. The Board of Water Commissioners of the city of Erie have kindly offered a location on the water works grounds at the side of the lake for the erection of a hatchery, and at this point the raw water of the lake can be obtained for use in the battery. Unfortunately, under the wording of the law the Department cannot use the \$7000 appropriated for building a hatching house on the new site. The Legislature is therefore asked to make a transfer of this money so that it can be used for building the hatchery on the grounds so generously tendered.

Few people outside of the city of Erie, appreciate the enormous importance of the Erie hatchery. It is largely through the work of the Erie hatchery that the fishing in Lake Erie is kept up to its present point. There are several million dollars invested in the fish business in the city of Erie, and to-day Erie is the largest fresh water fish market in the United States.

The last Legislature appropriated \$20,000 for the beginning of the work of erecting an artificial fish hatchery on Presque Isle Peninsula in Lake Erie. In going over this matter the Department decided that its best policy would be to limit its work to dredging out the inlets and outlets of the ponds on the Peninsula so as to restore the natural spawning beds which formerly were used by the fish in Presque Isle Bay. An opinion of the Attorney General was asked as to what the Department could do in the matter, and the Attorney General is of the opinion that under the wording of the law the money could not be expended in the manner proposed by the Department, but must be used in a way looking towards the erection of a hatchery, which for the present at least, the Department does not favor, as it would involve so large an expenditure of money that it is doubtful if an adequate return could be obtained from the same. By opening up the pools to the access of the fish much good work would be accomplished, and as the Peninsula has been turned over to the State, the question of an expensive artificial hatchery can be left for the future to settle.

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#### EXHIBITION AT CONNEAUT LAKE.

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At the request of the managers of the Annual Exhibition at Exposition Park, Conneaut Lake, the Department made its usual exhibit of aquaria and fish life. The display was placed under the charge of Philip H. Hartman, the Superintendent of the Erie hatchery, and was quite full as regards the more important fish life in Pennsylvania. It was a source of much interest to the visitors and the aquarium was always surrounded by a curious or admiring crowd. There is a fascination about fish in an aquarium to the average person and the Department is very glad to have an opportunity to make such displays because of their educational value.

Respectfully,  
N. R. BULLER,  
Commissioner.

#### REPORTS OF HATCHERY STATIONS.

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##### REPORT OF ERIE HATCHERY.

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P. H. Hartman, Superintendent.

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Hon. N. R. Buller, Commissioner of Fisheries.

Sir: I herewith beg to submit my annual report from December 1, 1911, to November 30, 1912.

The total number of eggs taken for the year were 104,878,000. These figures should have been more than three times what they were, but weather conditions in the fall of 1911 were the worst that have ever been recorded since fish hatcheries have been established on Lake Erie. For this reason the taking of white fish and herring eggs came near to being a blank.

All the eggs taken were held at Erie, and not knowing what effect chlorine (that was being used to purify the water) might have on green eggs, the Commissioner of Fisheries, Hon. N. R. Buller, instructed me to keep close watch for any effect that it might have. The latter part of December it was noticed that the eggs were beginning to die. I reported the same and was instructed to ship all eggs to Union City Hatchery, and by January 2, all eggs had been crated and shipped. All were returned when hatched and the fish planted in Lake Erie.

Immediately after transferring the eggs, the Commissioner ordered that no further attempts be made to hatch at this station, and instructed me to take down Battery No. 2, and ship same to Union City. This battery having a capacity of 260 jars of the McDonald pattern, was taken down and shipped with jars, spigots and tubes as per instructions.

The take of blue pike eggs last spring was also very small, only 21,070,000 eggs were taken, sent to Union City, hatched and the fish returned to Erie. The catch of this fish was the lightest ever had at Erie, and reports from other Lake Erie ports are the same. This is another instance showing that blue pike must be more extensively propagated, same as white fish, herring and pike-perch, better known as yellow pike. Pennsylvania, New York, Ohio, the United States Bureau of Fisheries, and the Canadian Government, all propagate white fish, herring and pike-perch, but Pennsylvania stands alone in the artificial propagation of blue pike; so it can hardly be expected that the lone work of this Commonwealth in this line can be sufficient to keep the supply equal to the demand.

It is evident that all commercial fish of Lake Erie that are extensively propagated are more and more on the increase, while those not propagated at all are becoming nearer extinct. The blue pike is too valuable a fish commercially and otherwise to let go by default of propagation, and it might be well to call attention to some of the other States on Lake Erie to aid in restoring them.

There were no pike-perch eggs received from the United States Bureau of Fisheries this year. This was owing to the very late opening of the lake, and the very severe storms prevailing which made the catches of pike-perch very light, especially so during the spawning season of this fish.

There were numerous shipments of yellow perch fry received from Union City Hatchery in the spring, all of which were planted in Presque Isle Bay, as were 200,000 maskalonge fry received from the same station. I might say that since perch fry are being planted in the Bay, hook and line fishing for perch has been steadily improving, and with the heavy plantings this last spring, the increase in the amount of perch in the Bay will be more noticeable than ever.

That the maskalonge planted in the Bay will thrive is proven by the fact that while seining for specimens for exhibition purposes, I took a number of young lunge running in size from five to seven inches, and had them on exhibition at the Conneaut Lake Fair. It was the first time that I had ever been able to catch such small ones in the Bay in all my experiences, which leaves no doubt but that it is due to last spring's stocking of them.

April 9, I began seining for adult blue gills and large mouth bass to be used as brood fish. In two weeks enough of both varieties were taken to supply all the hatcheries that I had been instructed to supply.

About the middle of May the question of ridding the Bay of carp came up. I might say that this has been an annual affair that comes up with the first carp that makes his appearance after the winter. Previous to this year carp fishing at Presque Isle Bay has been done done under a sort of a contract system. The man making the highest offer per month would get the sole privilege of catching the fish. He would be allowed five or six boats and 10 to 12 men. The contractor would control all the fish caught as the men could not sell to any one but the contractor. I called this matter to the attention of our present Commissioner, Hon. N. R. Buller, and asked him to look into the matter and see if under the existing law there was not some way of bettering this system so as to allow the fishermen to catch the carp and sell them to the one paying the best price, so as to do away with the one man or company contract. This the Commissioner said he would give his attention to at once and see how he could arrange it. The result was that Commissioner Buller finally decided that in order to get the best results and make it more satisfactory for the fishermen, and at the same time to encourage more to fish for carp, he would grant a license to any one or pair of men, to allow them to fish for three months, June, July and August, with gill nets having a mesh not less than five and one half inches stretched measure, for a prescribed fee of five dollars.

This was most pleasing to the fishermen, so much so that from June 1st to 19th, I had issued 20 licenses. From June 19th to the end of the season there was only one more issued. More would have been taken out, but small skiffs such as are used in carp fishing were not so plentiful that every one could rent or buy one, neither could they be built in time to be used in the heavy part of the fishing. I look for more to engage in it this coming year, as many are now making preparations, building boats and getting twine strung.

There were 117,711 pounds of carp taken out of the bay, valued at wholesale at \$1765.67. Many more can be caught by making the

three months to fish, May, June and July, instead of June, July and August. By the allowance of the month of May the catch can be more than doubled.

Acting under instructions from the Commissioner of Fisheries, to take charge of the State exhibit of live fishes at Exposition Park, Conneaut Lake, Pa., from August 26 to 31 inclusive, and to make it a better exhibit than the previous ones, the orders were carried out to the letter. More specimens and varieties of fish were exhibited from at any previous year, and the most perfect of all fish were used. Judging from remarks made by hundreds of people as they passed through the building, and the praise received from the Board of Managers of the Conneaut Lake Fair Association, it was plain that it was the finest exhibition ever put on.

In October the Commissioner wrote me that it would be impossible for him to go to Toronto, owing to other pressing engagements, and instructed me to go as his representative, call on the Superintendent of Game and Fisheries, Hon. E. Tinsley, and make such other arrangements as might be required to gather white fish eggs in the Province of Ontario, bordering on Lake Erie. He also directed me to visit all the shore fisheries between Port Dover and Dunnville, Ontario, and arrange for board for the spawntakers and engage teaming to haul eggs, etc. On this occasion I was accompanied by Mr. A. G. Buller, Superintendent of the Union City Hatchery.

Unfortunately, when we arrived at Toronto, Superintendent Tinsley had left for his home, but we were received by the official in charge, Mr. C. C. Cox, who informed us that the official permit had already been issued and forwarded to Harrisburg, and everything that we wished for had been granted and embodied therein. We at the same time partially arranged for an international exchange for fish and eggs, whereby Pennsylvania was to ship trout fingerlings and white fish fry back to be planted in Canadian waters. At the same time Mr. Cox said that he would try and arrange it so as to have some of their representatives visit the trout and bass stations of Pennsylvania, meet the Commissioner and further discuss arrangements for the exchange.

The visit was made as agreed, and as the visitors were personally taken charge of and shown the various hatcheries by yourself, all further details are familiar to you.

The arrangements made for taking eggs was complete in every way. There were six fisheries covered between Port Dover and Dunnville, Ontario, a distance of 24 miles. All eggs had to be hauled in relays from one fishery to another until they would reach Port Dover from where they were taken by the State Steamer, Commodore Perry, to Erie, thence via rail to Union City and Torresdale hatcheries.

The take of eggs was fairly good for this fall, still it could have been much better. Storms were not heavy, which was in our favor, but weather and water temperatures were high during the spawning of the white fish, so much so that the heavy runs of fish did not get into the inner reefs where the nets were located. Had the fish gone farther inshore on the shallower reefs, the catch would have been equal to those of other years and the take of eggs would have been just double what it was.

The shipments of white fish eggs received from the United States Bureau of Fisheries, at Put-in-Bay, this fall was also very gratifying. There were nearly 40,000,000 eggs for 1912, against none for 1911. These eggs all looked fairly good when received by me, and were shipped with the others to Union City and Torresdale hatcheries.

There were no herring eggs taken for Pennsylvania this fall, owing to the appropriation for field work becoming exhausted. This occurs regularly every second year or the final year's end of appropriations. The field appropriation should be at least double that of what it has been for the two years past, so that the good work of conservation of our natural resources can be carried out to its full limit. The taking of all eggs possible is one of our most important duties, for it is one of the largest natural food supplies, and a very important factor in the cost of living. A loss of one or two million eggs through lack of funds for gathering them, means the loss of that many millions of fry for restocking, and an unknown loss to the consumer, and which can only be guessed at by the Commissioner of Fisheries, and others actively engaged in fish culture.

I was instructed to co-operate with representatives of the New York Forest, Fish & Game Commission, in the taking of white fish and herring eggs. This was done, and the number of eggs taken and received by them was very satisfactory to all concerned. A statement of eggs taken and where shipped will be found hereto attached.

The amount of license fees collected for fishing tugs, nets and other devices used in Pennsylvania waters of Lake Erie amounted to one thousand nine hundred and seventeen dollars. The collections would have been more, as there were many tugs from other ports wished to come here and fish, but there was no available room for dockage.

Pennsylvania has the honor of having the largest fresh water fishing port in the world at Erie, and when one takes into consideration that approximately one half million dollars worth of fish business is handled in the two State Canal Basins, at the same time giving mooring to nearly seventy-five fishing vessels at times, and the combined area of said two basins is not 3000 feet square, it is something wonderful.

The Legislature, two years ago, made an appropriation to dredge and otherwise maintain the canal basins. Another and larger appropriation is needed to complete the work undertaken. I dare say that it is money to be well spent by the State, and the license fees collected by the Department of Fisheries, is the only direct revenue that I know of that the State gets from its Canal Basins. The future increase in license collections depends upon the maintenance of the Canal Basins, as well as the future increase of the fishing business. The basins must be dredged to a greater depth so that all sides of basins can be used for dockage, or the honor of having the largest fishing port will eventually go to some other State, and no doubt others would gladly accept the honor.

The State tug, Commodore Perry, has now been in commission nearly six years, and it is nearly that old. In this time she has been of valuable assistance to the Department in the enforcement of the fishing regulations, collection of license fees, gathering spawn in for-

sign ports and transporting same, in the planting of fish and fry, and catching brood fish for the hatcheries. On many occasions she has gone out into the lake and towed some smaller fishing craft that had become disabled, to save the crews from spending a night of terror or perhaps a worse fate in the lake. This fall the crew went out after darkness and found two gasoline tugs disabled and brought them safely home.

On October 12 word was telephoned to Erie that a steamer was in distress 10 miles east of Erie. When Captain Thorwald Mickelsen, of the Commodore Perry, got the word, he immediately steamed out of the harbor to render what assistance he could. The seas were running mountains high, and when the Perry reached the scene, he was signaled from land that the crew had reached the shore in their yawl boat. But the steamer had gone to the bottom and all that was visible of her was her foremast. It proved to have been the steamer Sylvester H. Martin, coal laden. After cruising around the wreck for nearly an hour, and seeing that he could be of no further assistance, the captain headed for home.

The Martin sank 10 miles northeast  $\frac{1}{4}$  east of Erie pier head light, directly in the steamboat course from Erie to the South Buffalo harbor entrance. She was lying in 54 feet of water and was a menace and danger to navigation, owing to numerous 75 to 100 foot steel wire cables dangling from her wrecked mainmast, and her foremast which was still standing. As the United States Government does not maintain a sea-going tug at Erie, lights had to be maintained on such portions of the wreck as were above water to warn all passing vessels. Captain Ernest V. Daggett, United States Watchman, appealed for assistance to Captain Mickelsen and myself, and we volunteered the services of the Commodore Perry and crew to maintain lights and do such wrecking service as might be wanted in the interest of navigation. At the expiration of the time allowed the owners of what disposition they intended to make of the sunken boat, and I understand all claims were waived at a certain date, Captain Daggett, with the aid of Captain Mickelsen and Commodore Perry, further wrecked the steamer and brought spars and cables ashore so that vessels could safely steam over the wreck without danger. The following letter of commendation was received from the United States District Officer at Buffalo:

WAR DEPARTMENT  
UNITED STATES ENGINEER OFFICE,  
540 Federal Building,  
Buffalo, N. Y.

Erie 35-32

October 31, 1912.

From: The District Officer.

To: Mr. Philip H. Hartman, Supt. Pennsylvania State Fish Hatchery, Erie Pa.

Through: Ernest V. Daggett, Watchman.

Subject: Assistance rendered maintaining light and removing masts from the wreck of the steamer MARTIN.

Reports having been received of the efficient volunteer service rendered by you and the Master and crew of the steamer "Commodore Perry" in assisting this office in maintaining a light and removing

masts from the wreck of the steamer "S. K. Martin" which foundered in Lake Erie ten miles east of Erie Harbor, Pa., October 12, 1912, I have hereby to express to you and to the Master and crew of the "Commodore Perry" through you, thanks and appreciation for the prompt and efficient aid rendered to the interests of navigation.

(Signed) J. E. WARREN,  
Colonel, Corps of Engineers, U. S. Army.

As stated above the Perry is now in her sixth year, and is beginning to depreciate very rapidly. She will need more extensive alterations and repairs this coming summer to make her more seaworthy. It would not take much of an additional appropriation over and above that needed for repairs, if the Perry could be sold and the money received from the sale used with it to build a new tug, and a larger one, which is beginning to be a necessity. There are times now when the Perry in planting fry is unable to keep the dock free of cans of fry sent down. As the output of the hatcheries is increasing each year the necessity for a larger tug becomes more apparent. A larger and more seaworthy tug is needed for the increasing traffic in eggs carried on between Pennsylvania and Canada. The work comes on at a time of the year when the five and six hundred foot steamers lie in shelter, but it must be a terrific storm that will hold the Perry in Canada or her home port when our work is on. We have the worst run on Lake Erie and at the most dangerous time of the year, so in order to protect the lives of the crew, the Department should have one of the staunchest tugs at all times.

Great credit is due Captain Mickelsen and crew for the manner in which they have attended to their duties in crossing Lake Erie in the fall storms in the interests of the Department. As a mariner, Captain Michelsen stands alone in his class.

I also wish to make mention of the new location offered by the Water Commissioners of the city of Erie for the erection of the new proposed fish hatchery. When it became known to the Water Commissioners that the Erie hatchery had to be abandoned on account of the chemicals used to purify the water, their public spirit and civic pride asserted itself at once and they immediately came forward and offered a plot of ground to the Commissioner of Fisheries for the use of the Department of Fisheries for the erection of a permanent hatchery in their beautiful water works park on the bay front. They have agreed to furnish light and heat for the building, and will also furnish other requirements as they are needed. I can say that this is an ideal location and its equal could not be found anywhere on the great lake for a hatchery location. It will mean the saving of at least one hundred and fifty dollars per year in dray bills, there will be no expense for light and heat, and the Commodore Perry can steam right upto the hatchery doors and load or unload. I can also say that if it were a money transaction to get this ideal site, that thirty thousand dollars would be a low figure, and would not buy it.

Much credit and many thanks are due to Water Commissioners, Mr. William Hamilton, Hon. Frank D. Schultz, Mr. B. B. Nagle, and the Hon. Clark M. Olds, ex-Commissioner, for their kind and valuable offer to the Department of Fisheries for the benefit of the citizens of Erie.

Thanking the Commissioner of Fisheries for his hearty support and courtesies extended the past year.

Respectfully submitted,  
PHIL. H. HARTMAN,  
Superintendent.

The following is the output of the hatchery:

Black Bass, large mouth, adults, .....	347
Bluegills, .....	872
Calico bass, .....	38

TO ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

Bull-heads, .....	26
Calico bass, .....	13
Dog fish, .....	6
Yellow perch, .....	20
Sunfish, .....	35
Gar pike, .....	1
Grass pike, .....	1
Blue pike eggs to Union City Hatchery, .....	21,070,000
White fish eggs to Union City Hatchery, .....	60,804,000
White fish eggs to Torresdale Hatchery, .....	16,812,000
White fish eggs to N. Y. Fish & Game Commission, ..	8,208,000
Herring eggs to Union City Hatchery, .....	5,565,000
White fish eggs from Canada, .....	42,000,000
White fish eggs from Port Clinton, .....	39,240,000

## CARRY HATCHERY.

Report of William Buller, Superintendent.

Honorable N. R. Buller, Commissioner of Fisheries.

Sir: I herewith submit my annual report from December 1, 1911, to November 30, 1912.

In accordance with your policy that all work done in the future should be with a view to permanency everything done during the past year was executed with that in mind. No. 2 hatching house had fallen into such a dilapidated condition that it was no longer worth spending money on for repairs, so it was torn down, and its site covered with a fish pond finished in re-inforced concrete of the most substantial character, and one that will need no money for repairs for years.

A surveyor was engaged to make a complete survey of the grounds so that it might be determined exactly their capabilities in the way of ponds and the adjuncts. Contracts were let to C. R. Rogers & Company for building twenty-eight ponds with re-inforced concrete, some of them replacing the old dilapidated ones. Twenty-four of these ponds have been entirely finished, the walls topped with a nice coping and are the subject of much complimentary comment from all that see them. In addition to these ponds an ornamental fountain was put in in concrete. Next season it is hoped to put in twenty-eight more ponds.

The ground around the ponds was graded and sown to grass, while new walks were laid out with concrete steps on the terraces. There are many natural resources at the Corry hatchery, which, aided by art will make it a beautiful place. It is hoped that the next Legislature will provide enough money to complete the ponds and erect a hatching house of concrete or brick, in which even the troughs shall be concrete, while a stream plant will make it comfortable for the workers in the winter time when the trout work is done.

The present No. 1 hatchery, is of frame and about ready to fall down, and fishery officials from other States who visited the hatchery during the year were astounded that the great Commonwealth of Pennsylvania would tolerate such a ruin as a part of its fish working machinery.

Early in the year after taking the eggs from the breeding trout, you directed that the large fish be distributed, as a new policy would be inaugurated hereafter. The trout eggs in future would be obtained from the commercial hatcheries where they are for the most

part waste products. The fish when hatched shall be kept in the ponds at the hatcheries until yearlings instead of being sent out in the spring as fingerlings.

The young fish at this hatchery do not grow so fast in the summer, as, for instance, at the Bellefonte hatchery, because the water is colder, but make up for it in the winter when the water is warmer than that at Bellefonte, for which reason probably more fish will be shipped from here in the spring than in the fall.

Began shipping the yearling fish that were originally held over from the 1911 hatch for breeders in April. They were from four to six inches long. November 30, began shipping the yearlings, hatched last fall. They ran from four to six inches in length, the smaller ones than that being thrown back to the ponds to be kept until spring when they will run from six to eight inches in length.

The new cans ordered by you have proven a great success for shipping the large fish, while incidentally the large opening makes them much more handily gotten at for aeration and other purposes.

There seems to be a more general satisfaction felt by the recipients of these large fish than was expressed when the fish were sent out in the fingerling stage. Applicants all say that they can see the fish, and believe that such fish can take better care of themselves and will not fall such an easy prey to their enemies.

Shingles were bought for repairing the roof of the dwelling of the assistant, but only a portion of the roof was replaced owing to the other demands on the men for other work.

The posts of the fence around the property were all painted, but the fence has fallen into bad shape so that even the brightness of the posts will not make up for the shabbiness of the rest of the fence. Experiments with fencing of various kinds have not evolved a lasting fence here, but it is hoped that replacing the present fence with one of concrete posts connected by three chains will solve the problem and be a thing of beauty.

A new meat chopper with a gasoline engine was put in and where it formerly took three or four hours to chop the fish food, the work is now done in quarter of an hour.

Some of the large pines on the grounds were cut down so that the lawn would not be killed off by their shadows and falling needles. They will be replaced with deciduous trees, more of which will be planted as there is time.

The year was a busy one for all hands, there being so much hauling of gravel and cement, together with the work of grading, while it was almost impossible to obtain needed help. The work of propagating suffered by the interference of the pond builders and the output of trout will show a falling off, which was to be expected, and I really must congratulate the Department on the fact that we did as well as we did. When all the contemplated permanent places are completed, I estimate that it will be possible to hold over two million fish to the yearling stage.

The new permanent ponds while more slightly are much more easily kept clean, which lightens very much the labor while the fish themselves are much more easily handled. The ponds arranged so that if necessary each one can be drawn off separately.

That there should be a heavy loss of fish during the year owing to

reconstruction work was absolutely unavoidable. It was necessary to utilize all the old ponds, many of which were in a sadly bad shape, the sides being full of crevices, and although the ponds were drained as thoroughly as possible and every precaution taken, some big fish would secrete themselves in the crevices and then prey on the little ones, causing hundreds of loss. The cunning of the large fish would have been a laughing matter if it were not so expensive. They rarely appeared in the day time, doing their foraging at night, and when by chance one did venture forth in the daylight the minute one of us approached the pond that fish darted for his hiding place with a speed that made it seem like a bright streak.

The brown trout at the hatchery did extremely well and we were able to supply at least in part the demand. The coming year it is expected that we will be able to fill in full all requisitions. The poor showing made in past years to propagate rainbow or California trout has caused the abandonment of their propagation here. Investigation has shown there are no Pennsylvania waters suitable for these trout. It is also found that by far the larger majority of people who apply for rainbow trout really wish brown trout because they desire trout that will live in warmer waters than the brook trout, and in such waters the brown trout will thrive while the rainbow trout require even colder water, if possible, than the brook trout.

While the amount of permanent work done was very considerable and largely added to the efficiency of the hatchery, it has also served to bring out the further requirements of doing the same thing to the other ponds, and it is to be hoped that the Legislature will make possible the rehabilitation of the whole plant so that Pennsylvania can point to the Corry hatchery with pride, and I think when the work is fully completed I can make everybody sit up and take notice when they learn the output of fish.

The output of fish for the year is herewith attached.

Respectfully,

WILLIAM BULLER,  
Superintendent.

BROOK TROUT.

County.	Size.	Number.
Cameron, -----	Yearlings, -----	1,320
Clearfield, -----	Yearlings, -----	1,600
Clinton, -----	Yearlings, -----	2,680
Crawford, -----	Yearlings, -----	2,695
Clarion, -----	Yearlings, -----	1,200
Erie, -----	Yearlings, -----	4,910
Erik, -----	Yearlings, -----	2,655
Forest, -----	Yearlings, -----	740
Jefferson, -----	Yearlings, -----	2,280
Lycomlng, -----	Yearlings, -----	1,200
McKean, -----	Yearlings, -----	3,930
Potter, -----	Yearlings, -----	6,350
Venango, -----	Yearlings, -----	6,030
Warren, -----	Yearlings, -----	2,475
	Total yearlings, -----	40,065
Potter, -----	Advanced Fry, -----	15,000

GERMAN BROWN TROUT.

County.	Size.	Number.
Clinton, -----	Yearling, -----	1,700
Clinton, -----	Adult, -----	50
Crawford, -----	Adult, -----	360
McKean, -----	Yearling, -----	300
Philadelphia, -----	Yearling, -----	300
Philadelphia, -----	Adults, -----	10
Warren, -----	Yearling, -----	225
Warren, -----	Adults, -----	680
		1,100
	Total yearling, -----	2,525
	Total adults, -----	2,525
	-----	1,100

RAINBOW TROUT.

County.	Size.	Number.
Erie, -----	Adults, -----	1,150
Warren, -----	Adults, -----	150
Lake trout fry planted in Lake Erie, -----	Total, -----	1,300
		280,000

SUMMARY.

Brook Trout, -----	40,065
German Brown Trout, -----	3,625
Rainbow Trout, -----	1,200
-----	-----
Advanced Fry, -----	44,990
	15,000
	-----

## BELLEVILLE HATCHERY.

Report of Wm. F. Haas, Superintendent.

Hon. N. R. Buller, Commissioner of Fisheries.

Sir: The following is the report of the operations of this hatchery for the year beginning December 1, 1911, and ending November 30, 1912:

With the beginning of the year, the taking of eggs was finished, and I had about four millions and a half. In accordance with your orders when the shipping season opened I shipped all the breeding fish in the hatchery, beginning the first of April and finishing June 16, as your policy as I understand it, is to use the hatcheries only to raise young fish to the yearling stage when they are to be shipped instead of in the fingerling stage, the eggs to be obtained from the commercial hatcheries. The young fish were kept through the summer and developed even beyond my expectations. Began shipping the yearling fish November 7, the fish then being from four to seven inches long, and all of them in the most healthy condition, as there were no troubles of any kind developed in the fish from the time of hatching until shipment.

From every consignment the messengers report the most decided satisfaction as to the condition of the fish received, and while the number received was much smaller than when the shipments were made in the fingerling stage, the recipient could see that the fish were trout and undoubtedly would afford trout for the angler next spring, if he had the skill and lure to take them. There is no question from what my messengers tell me of what they hear that the larger fish satisfy the public better than the tiny ones, because the average man appreciates more what he can see before him than what depends on a promise which the little ones seem to be to a man not versed in raising fish.

In fact a large majority of my fish were really over the legal size of six inches and the recipient knew that he could indulge in hopes of getting some of them next year without falling in the clutches of the law.

One of the greatest difficulties with which a Superintendent has to contend is the illegibility of the handwriting of the applicants for fish, and while sometimes it is funny, yet in most times the Superintendent is called up from the Department to know why he did not send so and so some fish. The name does not seem like anything he has ever seen, but it finally turns out that the Chinese puzzle he has worried over was the application in question. While I appreciate that the Department of Fisheries has only jurisdiction over fish, I wish there could be some way of inducing the Department of Public Schools bringing their influence to bear upon the growing generation so that the future Superintendents of Hatcheries will be able to read the names of applicants and the Post Offices where they live.

During the year the lawn has been graded and put in grass so

that it is really looking somewhat as it ought. The willows around the upper ponds were all pulled and look like trim embroideries for the finny enclosures.

The upper ponds were fed from the Logan Branch through an open raceway, and whenever there was the slightest fall of rain, the creek immediately became roily, the result being that most of the time it was impossible to see the fish in the ponds and therefore to determine their condition. In addition the sediment carried down by the water settled in the ponds making it necessary to clean them every few days entailing much extra work. A lease was secured from Mr. Shugart for the water from what is known as the Blue Spring, and a pipe line was laid to carry the water from there to the ponds, the result being that the water in the ponds is now clear and there is no longer any sediment deposited from the water. The spring was walled with concrete to prevent contamination by surface water.

A road was built from the hatchery to the station and a loading platform at the station erected to make loading the cans easier.

All the ponds were thoroughly cleaned out and about two hundreds loads of gravel were hauled to put the bottoms in first class condition.

The output of fish for the year is herewith attached.

Respectfully,

WM. F. HAAS,  
Superintendent.

BROOK TROUT.			
County.	Size.	Number.	
Bedford,	Yearling,	300	
Berks,	Yearling,	2,400	
Blair,	Yearling,	1,450	
Bradford,	Yearling,	500	
Centre,	Yearling,	8,800	
Columbia,	Yearling,	5,200	
Clinton,	Yearling,	2,750	
Cumberland,	Yearling,	600	
Clearfield,	Yearling,	600	
Dauphin,	Yearling,	1,800	
Franklin,	Yearling,	1,200	
Huntingdon,	Yearling,	400	
Lancaster,	Yearling,	1,800	
Lebanon,	Yearling,	1,550	
Luizerne,	Yearling,	300	
Lycoming,	Yearling,	5,050	
Northumberland,	Yearling,	1,650	
Mifflin,	Yearling,	3,000	
Potter,	Yearling,	1,350	
Schuylkill,	Yearling,	5,600	
Snyder,	Yearling,	600	
Sullivan,	Yearling,	5,300	
Tioga,	Yearling,	1,050	
Union,	Yearling,	5,200	
York,	Yearling,	300	
	Total yearling,	58,750	
	Fingerling,	53,500	

## GERMAN BROWN TROUT.

County.	Size.	Number.	
Clearfield,	Adults,	50	
Schuylkill,	Adults,	450	
Somerset,	Adults,	1,000	
	Total,	1,500	

## RAINBOW TROUT.

County.	Size.	Number.	
Centre,	Adults,	1,450	

## FAIRMOUNT PARK AQUARIUM.

County.	Size.	Number.	
Rainbow Trout,	1 year old,	10	
Brook Trout,	2 year old,	10	
Silver Salmon,	3 year old,	10	
Shipped to Spruce Creek, Brook Trout (sac stage),	4 year old,	10	
Shipped to Bucknell College, Fish with sac and sac absorbed,		75,000	
Eyed Trout Eggs,		2,500	
		1,697,750	

## SUMMARY.

Bellefonte.	Fingerling.	Yearling.	Adults.
Trout, Brook,	53,500	58,750	
Trout, German brown,			1,500
Trout, Rainbow,			1,450
Total,	53,500	58,750	2,950
Variety of fish for Philadelphia Aquarium,		50	
Shipped to Spruce Creek, Brook Trout, (sac stage),		75,000	
Shipped to Bucknell College (sac and sac absorbed),		2,500	
Eyed trout Eggs,		1,697,750	

## REPORT OF TORRESDALE HATCHERY.

J. R. Berkhous, Superintendent.

Hon. N. R. Buller, Commissioner of Fisheries.

Sir: I herewith submit my annual report of the operations of the Torresdale hatchery from December 1, 1911, to November 30, 1912.

As there were no white fish or herring eggs from the lake received at this hatchery during the fall of nineteen eleven, only one regular man was retained, and the work consisted of the usual routine.

In the spring numerous repairs were required on the sluices and banks of ponds as a result of an exceptionally cold winter and deep frost.

The yellow perch spawned first in the hatchery brood pond April 1, and continued all that month. There were also some yellow perch eggs gathered in field work from Bristol pond. All were hatched with but small loss and planted in the Delaware river and tributaries thereof.

Wall-eyed pike eggs were received April 26, from the Wayne hatchery, and were very fine eggs. In fact they were better than eyed up eggs generally are when received. The fry was sufficient to fill all applications and leave a large surplus to admit of a goodly plant in the upper Delaware.

While gathering yellow perch eggs there were 100,000 white sucker eggs collected and hatched with practically no loss, the fry being planted in the Delaware river.

The first shad eggs were collected April 25, and the spawning season lasted until the close of the season, June 10. After the shad started to spawn all attention possible was devoted to the gathering of the shad eggs.

The weather conditions and the temperature of the water through the spawning season was very favorable and the shad were plentiful in the river, most of the principal fishermen say that they caught twice as many as the year previous, but the prices received for them were not quite so high.

The fishermen generally are greatly in favor of the propagation of shad in the Delaware river, and are glad to render all assistance possible in the gathering of shad spawn.

The fry were all turned over to the New Jersey Fish Commission and planted in the Delaware river, with the exception of 2,000,000 which were planted by the New York Fish Commission.

The catfish that were shipped from this hatchery were nearly all of the yellow variety. All of the fish shipped were six months and one year old and were of a very nice size. There were a few gathered from the field work done on the Delaware river. There should be more of this work carried on on account of the adult fish spawning in such places that may go dry through the summer months, and the brood of little fish left to die.

The adult fish in the hatchery ponds look very good, but there should be at least three or four thousand more adult fish secured to fill up the capacity of the hatchery ponds. The young fish were all shipped out this fall. The applications were all filled and some

April 25, there were 160 blue-gilled sunfish received from the Union City hatchery which were placed in the brood ponds along planted in the Delaware and Susquehanna rivers.

with the adult fish that were there. They spawned early in the season and turned out very satisfactorily. The applications were all filled and there still remains a great many small fish in the hatchery ponds. The young fish at the hatchery grow very fast on account of there being so much animal life in the water.

There were a number of frogs shipped in the tadpole stage that were reared in the hatchery ponds.

There were some improvements made to the ponds and sluices. The grass was cut and the hatchery grounds were kept in good condition through the summer season. There was also a lot of unsightly brush and trees cut and grubbed out, which gives a much better appearance.

The fry ponds and the brood ponds were all cleaned out and most of the fish sorted, so they are in good shape for next spring's work.

November 24, the first consignment of white fish eggs were received from Lake Erie. On account of the short notice it was impossible to have the necessary repairs made on the pumps and boilers before the eggs were received. The eggs came from Ohio and Canada. The Ohio eggs do not look to be nearly as good as the Canada eggs, which look very nice.

I sincerely hope that the proposed improvements much talked of for the Torresdale hatchery will be made in the near future.

Thanking you for the courtesy you have given me.

Respectfully,

J. R. BERKHOUS,  
Superintendent.

The total number of fish distributed is as follows:

Yellow perch fry, .....	12,250,000
Yellow perch fingerlings, .....	170
Yellow perch adults, .....	12
Shad fry, .....	26,500,000
Wall-eyed pike fry, .....	10,000,000
White sucker fry, .....	100,000
Catfish fingerlings, .....	34,050
Catfish adults, .....	214
Sunfish fingerlings, .....	36,470
Sunfish adults, .....	364
Gold fish adults, .....	39
Sturgeon adults, .....	6
Frog adults, .....	4
Tadpole yearlings, .....	17,050
Eels, .....	25
Terrapin, .....	3

CAT FISH.

Adams, .....	Fingerling, .....	300
Allegheny, .....	Fingerling, .....	300
Armstrong, .....	Fingerling, .....	300
Beaver, .....	Fingerling, .....	500
Bedford, .....	Fingerling, .....	500
Bradford, .....	Fingerling, .....	200
Blair, .....	Fingerling, .....	500
Berks, .....	Fingerling, .....	4,111
Bucks, .....	Fingerling, .....	300
Cambria, .....	Fingerling, .....	900
Chester, .....	Fingerling, .....	3,500
Crawford, .....	Fingerling, .....	600
Delaware, .....	Fingerling, .....	400
Franklin, .....	Fingerling, .....	600
Huntingdon, .....	Fingerling, .....	1,000
Indiana, .....	Fingerling, .....	300
Lackawanna, .....	Fingerling, .....	1,200
Lancaster, .....	Fingerling, .....	1,100
Lehigh, .....	Fingerling, .....	1,100
Lebanon, .....	Fingerling, .....	1,200
Luizerne, .....	Fingerling, .....	400
Montgomery, .....	Fingerling, .....	650
Monroe, .....	Fingerling, .....	200
Montour, .....	Fingerling, .....	400
Northumberland, .....	Fingerling, .....	800
Philadelphia, .....	Fingerling, .....	550
Perry, .....	Fingerling, .....	250
Schuylkill, .....	Fingerling, .....	700
Snyder, .....	Fingerling, .....	200
Sullivan, .....	Fingerling, .....	800
Somerset, .....	Fingerling, .....	500
Susquehanna, .....	Fingerling, .....	400
Venango, .....	Fingerling, .....	300
Washington, .....	Fingerling, .....	300
Wyoming, .....	Fingerling, .....	600
Total, .....	.....	26,811

SUNFISH.

Chester, .....	Fingerling, .....	300
Lancaster, .....	Fingerling, .....	10,000
Montgomery, .....	Fingerling, .....	300
Montgomery, .....	Adults, .....	150
Philadelphia, .....	Fingerling, .....	10,000
Philadelphia, .....	Adults, .....	200
Susquehanna, .....	Fingerling, .....	100
Susquehanna, .....	Adults, .....	110
Susquehanna, .....	Yearling, .....	220
University of Pennsylvania, .....	Fingerling, .....	100
University of Pennsylvania, .....	Yearling, .....	50
Total, .....	.....	400 270 21,000

SUNFISH-BLUEGILLS.

Adams, .....	Fingerlings, .....	300
Allegheny, .....	Fingerlings, .....	300
Berks, .....	Fingerlings, .....	900
Bucks, .....	Fingerlings, .....	500
Blair, .....	Fingerlings, .....	500
Carbon, .....	Fingerlings, .....	600
Chester, .....	Fingerlings, .....	3,800
Delaware, .....	Fingerlings, .....	300
Franklin, .....	Fingerlings, .....	600
Indiana, .....	Fingerlings, .....	300
Lebanon, .....	Fingerlings, .....	1,500
Lehigh, .....	Fingerlings, .....	1,100
Lackawanna, .....	Fingerlings, .....	600
Montgomery, .....	Fingerlings, .....	2,600
Philadelphia, .....	Adults, .....	100
Pike, .....	Fingerlings, .....	600
Schuylkill, .....	Fingerlings, .....	600
Wyoming, .....	Fingerlings, .....	300
York, .....	Fingerlings, .....	300
Total, .....	.....	16,000

## TADPOLES.

Berks,	3,000
Chester,	2,000
Cumberland,	1,000
Dauphin,	1,000
Lancaster,	1,000
Lehigh,	6,000
Northampton,	2,000
Northumberland,	1,000
Philadelphia,	50
	=====
	17,050
	=====

## FROGS.

Northumberland,	2,000
	=====

## YELLOW PERCH.

Bucks,	Fry, 2,190,000
Indiana,	Fry, 10,060,000
Indiana,	Yearling, 150
Philadelphia,	Yearling, 20
Total,	12,250,000 170

## GOLD FISH.

Blair,	Adults, 40
Luzerne,	Adults, 20
	=====
	60
	=====

## SHAD FRY.

Planted in Delaware River, New York Fish Commission,	24,500,000 2,000,000
	=====
	26,500,000

## SHAD EGGS.

Bellevue Medical College,	35,000
	=====

## STURGEON.

Philadelphia,	Adults, 6
	=====

## WHITE SUCKERS.

Philadelphia,	Fry, 100,000
	=====

## PIKE PERCH.

Bedford,	Fry, 800,000
Cumberland,	Fry, 500,000
Dauphin,	Fry, 500,000
Delaware,	Fry, 200,000
Huntingdon,	Fry, 1,200,000
Lehigh,	Fry, 1,000,000
Monroe,	Fry, 1,750,000
Montgomery,	Fry, 1,000,000
Philadelphia,	Fry, 3,050,000
	=====
	10,000,000
	=====

## SUMMARY.

	Fingerling.		Yearling.	Adult.	Fry.
Catfish,	26,811				
Sunfish,	21,000		270	460	
Sunfish, Bluegill,	16,000			100	
Tadpoles (2 year old),		17,050			
Frogs,		2,000			
Yellow Perch,			170		12,250,000
Gold Fish,				60	
Shad fry,					26,500,000
Sturgeon,				6	
White Suckers,					100,000
Pike Perch,					10,000,000
	63,811		440	626	48,850,000
Tadpoles,					17,050
Frogs,					2,000
	=====		=====		=====

## REPORT OF UNION CITY AUXILIARY HATCHERY.

A. G. Buller, Superintendent.

Hon. N. R. Buller, Commissioner of Fisheries.

Dear Sir: The following is my report from December 1, 1911, to November 30, 1912:

During the month of January I received the white fish and lake herring eggs that had been in the Erie hatchery. These eggs were transferred to this place as the lake water at that time was being chemically treated before going into the city mains on account of an epidemic of typhoid fever. The chemicals had already killed a large percentage of these eggs, but I was able to hatch 3,240,000 white fish, and 5,600,000 lake herring. These fish were planted in Lake Erie during the month of April.

The last of April I received 12,000,000 pike perch eggs from the

Wayne county hatchery. These eggs were eyed. I wish to speak in particular of these eggs. The quality was especially fine and they looked like hand picked eggs for as a rule these eggs are hard to clean.

In former years we received from the United States Bureau of Fisheries a portion of the pike-perch eggs taken at Toledo and Port Clinton, Ohio. The same arrangements were made for this year, but on account of poor weather conditions at spawning season there were few eggs collected and we were unable to obtain any eggs from those spawning grounds.

I am glad to report the condition of the pike perch fry at the time of shipment. This was due to the large amount of tank room which has been installed during this year. I was thus able to hold these fish at least one week after they were hatched. The pike perch is extremely delicate when first hatched and it was pleasing to notice how strong and vigorous they had become in this length of time. Some of these fish were planted in Conneaut Lake and it was gratifying to hear the expressions made as to the quantity and condition of the fish when received there.

In May I received 300 quarts of yellow perch eggs from the Wayne county hatchery, filling one battery. These eggs were of fine quality and I was able to hold the yellow perch fry longer than on former occasions.

I had received notice from you stating there would be a shipment of muscallonge eggs from the New York Fish Commission. May 14, Mr. Winchester, Superintendent of Bemis Point Hatchery, delivered 300,000 eyed eggs. These eggs were so far advanced in handling that a portion of the eggs were hatched while being transferred.

A few days later I was notified to send a messenger to Bemis Point for a consignment of fry. We received in all 500,000 muscallonge eggs and fry. These fish were planted in the following places: Conneaut Lakes, 200,000; Conneautte Lake, 40,000; LeBouef Lake, 40,000; Presque Isle Bay, 200,000. During the time these eggs were being hatched several of the fry were carried to the large pond on the grounds when it was surprising to see the rapid growth of the fish. In September I took several out of the pond for the fish exhibit at the Conneaut Lake Fair measuring six and seven inches and I have six of these fish in one of the ponds at the present time which measure ten and twelve inches.

Mr. Philip H. Hartman, of the Erie Hatchery, made all necessary preparations for the collection of blue pike eggs, but the boats out of Erie discontinued fishing about the time the fish began to spawn and we were therefore unable to gather many eggs.

During July and August of 1911 secured a large number of small mouth black bass, and was satisfied that the greater number of these fish were females, as they ran quite large in size, but this spring at spawning time I had the same disappointing results, as out of 85 fish there were only six females. What bass were hatched were held in the ponds, and at the time of shipment measured from two to six inches in length. All the persons who received them were pleased with the size of the fish.

All fish hatched at this station during the year have been distributed with the exception of blue gills and tadpoles. These will be held for the spring distribution.

The same arrangements were made with the United States Bureau of Fisheries for the collection of white fish eggs as in previous years, and during the sprawning season I received 18,036,000. Mr. Hartman was very successful in collecting a large quantity of white fish eggs from the Canadian Fisheries, the number of eggs I received from this collection being 42,768,000, and I now have two batteries filled with good eggs.

#### IMPROVEMENTS.

Removing partitions from three ponds making one large pond north of the battery house which will be used for a bass spawning pond.

Also removed partitions from two other ponds making a large pond to be used for rearing blue gills.

Completed a large pond covering over one acre of ground to be used for blue gill breeding pond.

Rebuilt the cement splash at the upper dam and laid fifteen inch drain pipe from this dam to the creek, in order to get a direct outlet to the creek when needed. Placed two concrete gates in the same dam. Also laid four inch pipe from dam to battery house, a distance of eight hundred and fifty feet. Laid one and one fourth inch galvanized pipe from city main to dwelling house, a distance of four hundred and fifty feet, replacing a very dilapidated and rusted line.

Another battery was built in the hatchery, also four large fry tanks. The inside of the hatching house was ceiled.

#### SUGGESTIONS.

I wish to mention the need of new cement gates in the different ponds to replace the old wooden gates. The fences are also becoming dilapidated. The buildings should have two coats of paint and the roofs need fixing. The barn should be enlarged with other necessary repairs.

I trust this report will meet with your approval.

Respectfully,

A. G. BULLER,  
Superintendent.

The following is the output of fish for the year:

PIKE PERCH.		
County.	Size.	Number.
Allegheny, -----	Fry, -----	580,000
Crawford, -----	Fry, -----	2,030,000
Erie, -----	Fry, -----	870,000
Forest, -----	Fry, -----	1,160,000
Lycoming, -----	Fry, -----	725,000
Venango, -----	Fry, -----	2,755,000
Warren, -----	Fry, -----	1,015,000
	Total, -----	9,135,000
	=====	=====

## YELLOW PERCH.

	Adults.	Fingerling.	Yearling.	Fry.
Armstrong,		4,950	100	
Allegheny,		1,750		
Beaver,		3,000		
Butler,		500		
Cumberland,		1,250		
Crawford,		1,200		
Erie,			10,000,000	
Franklin,		1,250		
Lawrence,		1,250		
Mercer,			275	
Somerset,		2,500		
Sullivan,	300	600		
Venango,		2,250		
Warren,		1,250	600	
Westmoreland,		1,000		
	300	22,750	975	10,000,000

## MUSCALONGE.

County.	Size.	Number.
Crawford,	Fry,	280,000
Erie,	Fry,	200,000
		=====
	Total,	480,000

## BLUE PIKE.

Erie,	Fry,	2,000,000
		=====

## CALICO BASS.

Erie,	Adults,	78
		=====

## ROCK BASS.

Erie,	Adults,	100
		=====

## GOLD FISH.

Erie,	Yearling,	30
		=====

## SMALL MOUTH BASS.

	Fingerling.	Adults.
Beaver,		200
Centre,		150
Cumberland,		150
Fayette,		100
Forest,		90
Juniata,		150
Lancaster,		700
Lycoming,		80
Lebanon,		500
Mercer,		33
Perry,		150
Sullivan,		70
Union,		36
Venango,		120
Warren,		30
Washington,		180
Westmoreland,		150
		18
Total,	2,850	217

## LARGE MOUTH BASS.

	Fingerling.	Adults.
Cumberland,		300
Erie,		372
Lancaster,		150
Lycoming,		120
Perry,		150
Wayne,		12
		346
Total,	732	718

## SUNFISH—BLUEGILLS.

	Fingerling.	Yearling.	Minnows.
Allegheny,		100	45
Armstrong,		600	
Crawford,			400
Erie,			1,025
Forest,		500	
Huntingdon,		100	
Lehigh,		200	
Philadelphia,		100	
Sullivan,		300	
Venango,			400
Total,	1,729	700	2,170

## LAKE HERRING.

Erie, .....	Fry, .....	5,600,000
		=====

## WHITE FISH.

Erie, .....	Fry, .....	3,240,000
		=====

## WALL EYED PIKE.

Huntingdon, .....	Fry, .....	725,000
		=====

TADPOLES.  
(2 Year Old.)

Armstrong, .....		1,000
Beaver, .....		1,500
Butler, .....		1,000
Crawford, .....		1,000
Clinton, .....		1,800
Mercer, .....		900
Somerset, .....		1,000
Venango, .....		1,000
Total, .....		9,200
		=====

## SUMMARY.

		Fingerling.	Yearling.	Adults.	Fry.
Blue Pike, .....					2,000,000
Bass, Calico, .....				78	-----
Bass, Rock, .....			100	-----	
Bass, Small Mouth, .....	2,850		217	-----	
Bass, Large Mouth, .....	732		718	-----	
Gold Fish, .....		30	-----		
Lake Herring, .....				5,600,000	
Muscallonge, .....				280,000	
Pike Perch, .....				9,125,000	
Sunfish, Bluegills, .....	1,729		700	2,170	-----
Tadpoles, 2 year old, .....		9,200	-----		
Wall-eyed Pike, .....				725,000	
White Fish, .....				3,240,000	
Yellow Perch, .....			975	300	-----
<b>Total, .....</b>	<b>28,061</b>	<b>9,200</b>	<b>1,705</b>	<b>3,583</b>	<b>20,980,000</b>
					=====

## SPRUCE CREEK.

Report of Wm. F. Haas, Superintendent.

Hon. N. R. Butler, Commissioner of Fisheries.

Sir: The following is the report of the operations of the Spruce Creek hatchery for the year beginning December 1, 1911, and ending November 30, 1912:

As I reported last year, a cloudburst in September, 1911, raised Spruce Creek to such a height that the rushing waters and the back water tore down the hatching house and washed out many of the ponds carrying away thousands of fish. A few weeks later a second flood about completed the destruction of the hatchery as it tore out nearly all the ponds that were left by the first one. The Board of Fishery Commission then decided, as there were no funds to replace the damage done, the hatchery should be left in the charge of a caretaker. During the year, however, I used the few ponds not damaged by the floods as stock ponds to raise trout sent over from the Bellefonte hatchery. These fish were all shipped out before the end of the year.

During my superintendency of the Spruce Creek hatchery of five years there were five floods all doing much damage and causing the loss of many fish. Twice the bridge was washed away and there was no way of getting out with shipments of fish until the bridge was rebuilt. This was a bad thing but in addition once when the bridge went out it was a ticklish business for myself and horses to get home through the swollen waters. I would recommend, in view of all the facts, the abandonment of Spruce Creek Hatchery.

The output of fish for the year is herewith attached.

Respectfully,  
WM. F. HAAS,  
Superintendent.

## BROOK TROUT.

County.	Size.	Number.
Bedford, .....	Yearling, .....	2,500
Blair, .....	Yearling, .....	5,950
Bucks, .....	Yearling, .....	900
Berks, .....	Yearling, .....	1,600
Bradford, .....	Yearling, .....	1,200
Centre, .....	Yearling, .....	1,200
Columbia, .....	Yearling, .....	3,700
Cambria, .....	Yearling, .....	200
Clearfield, .....	Yearling, .....	3,400
Chester, .....	Yearling, .....	3,800
Cumberland, .....	Yearling, .....	3,400
Delaware, .....	Yearling, .....	800
Dauphin, .....	Yearling, .....	300
Fulton, .....	Yearling, .....	1,000
Franklin, .....	Yearling, .....	1,200
Fayette, .....	Yearling, .....	1,300
Huntingdon, .....	Yearling, .....	500
Indiana, .....	Yearling, .....	2,780
		800

## BROOK TROUT—Continued.

Juniata, -----	Yearling, -----	400
Luzerne, -----	Yearling, -----	400
Lancaster, -----	Yearling, -----	2,000
Lebanon, -----	Yearling, -----	400
Lehigh, -----	Yearling, -----	600
Lycoming, -----	Yearling, -----	2,500
Montgomery, -----	Yearling, -----	850
Mifflin, -----	Yearling, -----	2,000
Northumberland, -----	Yearling, -----	150
Perry, -----	Yearling, -----	700
Sullivan, -----	Yearling, -----	2,300
Snyder, -----	Yearling, -----	200
Schuylkill, -----	Yearling, -----	2,200
Somerset, -----	Yearling, -----	6,500
Tioga, -----	Yearling, -----	1,900
Westmoreland, -----	Yearling, -----	4,100
York, -----	Yearling, -----	400
Total, -----	-----	62,930
	=====	=====

## GERMAN BROWN TROUT.

Bedford, -----	Adults, -----	600
Huntingdon, -----	Adults, -----	100
Juniata, -----	Adults, -----	100
Luzerne, -----	Adults, -----	1,200
Lycoming, -----	Adults, -----	400
Schuylkill, -----	Adults, -----	400
	=====	=====
	2,800	
	=====	=====

## SUMMARY.

Brook Trout, -----	62,930
German Brown Trout, -----	2,800

## REPORT OF WAYNE HATCHERY.

G. W. Buller, Foreman.

Hon. N. R. Buller, Commissioner of Fisheries.

Sir: Herewith is submitted the report of the operations of the Wayne hatchery for the year ending November 30, 1912.

The year has been a busy one in striving to bring to completion the various adjuncts of this hatchery necessary for its doing the best work. A lease was secured for the use of the Beaver Dam Reservoir which insures for the hatchery a full supply of water and at the same time will make available 100 acres or more of water for the purpose of bass and pickerel work.

The dwelling house was in an extremely bad condition, some of the floors threatening to fall into the cellar. The building has been completely repaired and put in order, with an addition which now

makes available 22 rooms. This may seem a large number, but this hatchery must be the one for which the greater part of the field work of the Department must be done, and it is necessary to provide places for the lodging of the field work men. Within a short radius of this hatchery there are a large number of lakes from which an ample supply of such fish as yellow perch, sunfish and pickerel can be obtained, and at the same time they can be used for bass culture.

Two large bass ponds covering between five and six acres have been completed. Stone walls have been built on both sides of the creek from the bridge below the hatchery to about half way through the property. It is contemplated to put a series of dams in the creek which will turn the water out on the various ponds which are to be erected. Two of these dams have been completed. A large amount of grading has been done utilizing the earth taken from the ponds. Much of this work, of course, has been preliminary, but it is hoped to be able to complete this during the coming year when there will be sufficient concrete work to be done to have a mixer come in and finish up what is to be completed. The following is the distribution of fish:

Respectfully,  
G. W. BULLER,  
Foreman.

## BROOK TROUT.

County.	Number.	
Bradford, -----	Yearling, -----	1,400
Carbon, -----	Yearling, -----	10,050
Lackawanna, -----	Yearling, -----	7,850
Lehigh, -----	Yearling, -----	1,100
Luzerne, -----	Yearling, -----	6,000
Monroe, -----	Yearling, -----	8,800
Northampton, -----	Yearling, -----	2,550
Pike, -----	Yearling, -----	3,300
Schuylkill, -----	Yearling, -----	150
Sullivan, -----	Yearling, -----	2,400
Susquehanna, -----	Yearling, -----	7,500
Wayne, -----	Yearling, -----	6,000
Wyoming, -----	Yearling, -----	3,300
Total, -----	-----	61,000
	=====	=====

## LARGE MOUTH BASS.

Lehigh, -----	Adults, -----	310
Wayne, -----	Adults, -----	350
Total, -----	-----	350
	=====	=====

## PIKE PERCH.

Bradford, -----	Advanced fry, -----	950,000
Lackawanna, -----	Advanced fry, -----	500,000
Luzerne, -----	Advanced fry, -----	1,000,000
Pike, -----	Advanced fry, -----	1,000,000
Susquehanna, -----	Advanced fry, -----	1,500,000
Wayne, -----	Advanced fry, -----	2,500,000
Wyoming, -----	Advanced fry, -----	2,700,000
Total, -----	-----	10,150,000
	=====	=====

YELLOW PERCH.			
	Advanced fry,	2,500,000	
Susquehanna,	Advanced fry,	35,000,000	
Wayne,	Total,	37,500,000	=====
LAKE TROUT.			
Luzerne,	Fingerling,	30,000	
Wayne,	Fingerling,	20,000	
	Total,	50,000	=====
Brook Trout eggs, received (136 quarts),		1,904,000	=====
SUMMARY.			
	Fingerling.	Yearling.	Adults.
			FRY.
Bass, Large mouth,		350	
Perch, Yellow,			37,500,000
Perch Pike,			10,150,000
Trout, Brook,		61,000	
Trout, Lake,			
	50,000		
Total,	50,000	61,000	350
	=====	=====	=====
Brook trout eggs received,			47,650,000
Pike Perch eggs received from New York Fish and Game Commission,			1,904,000
			35,000,000

## BAIT FISH.

The question of bait fish is becoming one of more importance every year as the supply has been diminished by the demand made upon them by the anglers and dealers in bait fish. To increase the supply is the desire of the Department and among the most suitable bait fish, especially for the anglers for pike-perch or Susquehanna salmon, is the lamprey eel. The Department is indebted to Dr. Hugh Hamilton for the following very interesting article on the subject of the lamprey.

## THE SUSQUEHANNA RIVER LAMPREY.

By Hugh Hamilton, M. D., Harrisburg, Pa.

The economies of the larval forms of the lamprey, and other sources of live animals, used for bait is the subject that stimulated

this inquiry, because it is part of the food eagerly sought by fish and without such food supply in sufficiency, it is useless to hatch artificially any fish for restocking streams, for a denser and more stable population is here now than there was a hundred years ago. The Indian was nomadic, and when for his sustenance there was demanded exhausting search, he moved to a locality that afforded it more easily. Indeed, it is still one of the main reasons for the increasing movement of immigration of people now from long distances, as the Eastern European and Asiatic countries to the littoral of America, where wages to gratify both needs and wants are obtainable.

Wild animal life does the same thing and fish follow the rule. Fish food is not infrequently interfered with or depleted by natural causes, such as ice, floods and catastrophe, as land slides or artificial agencies, embracing both obstructions and sudden noises in the streams or annihilation by contamination and pollution, to escape which the big fish may follow the little ones when they go away.

Preservation of species compels persistent hunting for necessary subsistence. In the artificial production of fish spawn or fry, it makes them dependent upon man's protection, and the suitable and choice food he gives them, so that they become tame and look for their rations at fixed hours. This fact makes them unalert to the dangers of life, such as "the big fish eating the little ones," or exerting themselves to capture food, when transplanted where they must look after their own welfare.

Aside from any other view "big fish" need large quantities of "little fish" to live and, "little fish" must be more than enough for "that big fish" or the fish food ("little fish") as species would be exterminated, and the "big fish" (the sportsman's delight) could not grow and so moves to another place than the one where that sportsman goes to angle.

This thought applied to the lamprey, or other bait, becomes worthy of study, for the purposes of which the Pennsylvania Department of Fisheries exists. All real sportsmen are keen observers of nature, and are obedient to all laws for the increase and proper restrictive preservation of game, fish or fowl. The predatory fisherman, huntsman or poacher is also an observer of nature, but like a burglar, uses his wits for inferior aims. The former is a generous ally and encourages the State officials to do their full duty. The latter is an embittered and selfish enemy of all who would help his fellow citizen through State aid.

The successful fisherman studies the best bait to lure big fish to his hook and line, and one of the best is the lamprey eel found in the sands of the Susquehanna river and its tributaries, but its growing scarcity, due to the demand for bass and salmon fishing, has raised the price from three cents a dozen to quite five cents for a single one, or sixty cents a dozen. This alone does not account for the failing supply. The dredging machines taking river coal at Harrisburg, and at other points along the Susquehanna river from Scranton to tidewater, remove and exterminate larval lampreys. I have dug quantities of them in the silt on the down river points of the sand bars in water a few inches deep, before the general employment of these machines.

They are not to be found now, nearly so plentiful. The mere digging sand with a shovel does not so ruthlessly destroy the delicate animal as does the stream driven rotary screens of the coal dredges, for they kill the individual lamprey and limit the propagation. Hence the call for a careful consideration of how to supply a bait that the good game fish, so industriously propagated by the Department of Fisheries of this State, may be easily brought to creel, and commends the matter for future matured plans. To best accomplish this it is essential to discover some of the habits of this lamprey, the lowest of fishes, in classification by ichthyologists. The Susquehanna river lamprey may be an off-shoot or modification of the Cayuga Lake, New York, scientifically studied and described lamprey (*Lampetra Wilderii*), by Professor Gage.

The scientific classification of fish is based upon their bones, commencing with those which have no bones at all. There is a class of low squirming worms that have soft fins, and nearly as soft or grizzly, not bony, backbones or vertebrae, with a spinal cord or column that does not expand into the brain. They are called *A-erania* (without any soft or hard skull). This is the lowest division of the vertebrates. The lamprey is in the class immediately above this one, and is called *Cran-iota* (an "iota" or very small brain) enclosed in a skull of cartilage or grizzle, but not bone. Its development is a totally grizzly skeleton, a skin without scales, soft fins starting on the back at about twice the length of the head from the mouth, passing thence over the tail and up the middle line of the belly to a point at the vent, a little short of the middle of the length of the fish.

In its head in the middle (median) line is one nostril, (not two like most fish). Its mouth is "sucker like," its teeth are horny, not bone or ivory, and are placed around its sucking throat through which its tongue moves like a piston in a syringe, armed with peculiar teeth. The eyes are on each side of the nostril, and the seven openings on each side of the body (which might be called "the chest") form the sacs by which it breathes. They are neither eyes nor gills. One of the reasons these holes are called "eyes" is because in the undeveloped or larval state of the "eel," which is familiar to fishermen. At that time its eyes are covered by a thick membrane of the same general color as its body and are therefore unnoticed. In some localities it is known as "Seven or Nine Eyes." This popular description is that of the second class under *Craniota*, known scientifically as *Marsipobranchii* (pocket or sac-lung-breathers).

The true lamprey has but a single nostril which is a mere sac and does not penetrate or go through the palate which places it in an order named *Hypero-artii*, meaning the palate (or roof of the mouth) has no connection with the nose, a remarkable exception in the *vertebrata* or back-boned animals. When one inspects numbers of this animal it is found that they all have a long slim worm-like body from about six to thirty six inches long. That their color is either uniform or more or less shaded in varied spots. They have a nearly round body tapering and flattened in the lower third, possesses no scales, have no bony fins and none on the sides of its body, just one beginning a little below the head and going along around

the tail to the vent, which is far removed from the mouth, eyes developed in the adult only, nostril on the top of the head, and only one, primitive lips with fringe like edges and seven gill openings in a row on a line below and back of the eyes.

If you take up one you will find the mouth is oblong in the direction of the length of the body on the animal. In the adult is is somewhat more circular and it acts in a sucking fashion. Spread its mouth open and you will find its fringed sides covered with cartilaginous teeth or tubercles (knobs), some slightly horny depending much upon its approach to mature growth. On the end of its tongue we see teeth. The tongue works up and down in the throat, rubbing the tip against the sides that have teeth also (because it has no jaws, this means a sort of chewing, grinding, process), besides the gullet has a spiral valve to twist the contents onward similar to a turbine. The eggs are quite small. From these observations one perceives that their structure is very simple compared to the family of fishes that have side fins.

From their adult habit of hanging, like water-logged sticks or faggots, on the down-stream surfaces of rocks, the high sounding family name has been given it of "Petro-myzon-idae" from Greek words meaning *sucker of rocks*. Now the larval lampreys, (near Harrisburg, Pa.) are of small size, about six or eight inches in length, and have a soft dorsal fin following the general description given for the family, (Photograph No. 2) slightly divided in its posterior part but continuous around the tail. On its upper lip it has a broad crescentic shaped tooth and teeth on the end of its tongue. See Photograph No. 7. These characteristics point to the genus called "*Lampetra*" from *lampre* to suck and *petra* a pebble.

Scientific method (Fishes of North American, U. S. Nat. Museum Bull., 47 Wash. D. C. 1896, Part 1) systematizes fishes into certain divisions, classes, orders, families, genus, species and varieties, according to their physical development relative to a fish.

It is with no little timidity that I define what a FISH is to my mind:

An animal having a straight spinal cord, protected by a membranous, grizzly (cartilaginous) or bony (osseous) structure, or the whole three of them combined, in the same individual, unable to exist out of an aquatic element, such as wet mud or wet sand covered with water, simple water, and seeking its supply of oxygen through simple lung sacs or gills, possessed of rapid locomotion by means of squirming activities, using fins either hard or soft for that purpose. The lamprey moves like a boat propelled by a stern oar, while fish that have stiff side fins move similarly in addition to the vertical ones on back and belly, and can go horizontally.

The fish develops a nodule or nodules at the head of the spinal column that fixes his place in a Division. As a protection to the spinal cord grows to a more complete bony formation, the method of breathing becomes more complex and the blood is colored RED, but below 98 degrees F., or cold-blooded. The division of *a-erania* fishes have white blood. They are put into definite CLASSES. They may be arranged according to some marked difference in particulars into ORDERS: Such as having no nostril, as the hags, one nostril, as the lamprey, or two nostrils as the sunfish. The external general

form and colors often are made the way to find out the FAMILY. More minute examinations both externally and internally are necessary to determine the GENUS and very large numbers of individuals must possess identical features. When we come down to the species, every possible means must be employed to individualize it from every other specimen in instinct and habit, external characteristics, internal anatomy and all vital functions in existence and propagation. It is an exceedingly important matter that one's observations are unbiased, for this is the only way to know the object and recognize it by description for classification.

Economically it is to know "What's What," and "Therefore" is then apparent.

By this system the lamprey belongs to Pisces or Fishes.

Division—Craniota, or little brains.

Order—Hyper-artii, or complete palate.

Family—Petro myzon-idae, or rock suckers.

Genus—Lampetra, or stone suckers.

Species—Lamprey, (*Susquehanna* river lamprey) (Wilderii).

Lampreys have no jaws, no shoulder, or pelvic arches, hence no corresponding upper or lower fins or members present as in all other true fishes. The Susquehanna lamprey eel (larval) is about four to eight inches long very active, is of light olive to a darker hue sometimes becoming apparently blue and has a yellowish belly. I have never seen a blue one like the river eel, (*Acquilla-rostrata*). It occasionally seems spotted, lies on its side to rest when in captivity and will lie outside on water-covered sand on its belly for hours. The fin is slightly serrated and the notch in the fin in its back on its way round the tail is not always clearly defined. Its method of movement in the water is depicted from the active living specimen in the photograph No. 1.

An examination and photograph of the mouth of the living Susquehanna lamprey, larval, from one to eight inches long is shown in photograph No. 2 (and explanation). The nasal opening is a longish slit. The "gill" in the larval state may have its water circulation demonstrated through which its blood is oxygenated, by dropping a few grains of cornstarch in the water before the mouth, as recommended by Gage. To accomplish the same purpose, I immersed the live lamprey in a dilute solution of iodide of potassa, wiped it off quickly with absorbent paper, put it into a very dilute mixture of starch when the streams of blue were thrown far to the rear, more than the length of the creature.

The "Transformed" lamprey gotten November 19, 1912, is one which has a dark, copper colored appearance, fins slightly lighter, belly silvery edged with blue on each side. The same experiments upon the Transformed lamprey showed the intake to the lung sacs to be exactly at right angles to the body, and the expulsion or out-go of the expired water was thrown the whole length of the animal. The nostril used the air in the water the same way perpendicular to the body and expelled it with force far upward and forward. The chest, the portion about the "holes" was very active at times and was very strongly made. By the prehensile rim of its mouth it fastens itself to objects and fish like a boy's leather "sucker." Its mouth has fringed edges and is filled with pointed teeth disposed in spirals, like

a grinding mill or teeth of a file in the lower portion fine grains of sharp sand about the size of the teeth, evidently designed for mastication by rotary motion.

The tongue is much shorter and blunter than in the larval existence and blunt. It will take hold of the hand and fingers or a piece of glass, china, or pebbles, and hold on out of the water. Its strength in proportion to its body weight is enormous, as I saw it pick pebbles up three times its weight. The motion of swimming (Photograph No. V, Fig. 1, 2 and 3) is different from that of the larval form. The mouth against glass is seen in Photograph No. VI.

When the mouth is pinned back on a cork, painted white through a hole in the cork, photographed under water is as in Photograph No. 7, Plates 1 and 2, showing the armed tongue that is short compared to the larval. The lung sac orifices are quite round and defined by dark edges. Other dissections were not made. The eye looks slightly downward and is large compared to the animal. Its appearance is viciously energetic and forbidding.

Its motions vary much more than the larval form and may be fast or slow. It moves closer to the surface of the water and see Photograph V. Fig. 1, 2 and 3.

An ingenious method of capturing these diminutive and slippery creatures is suggested and published by the Hon. H. A. Surface, State Zoologist of Pennsylvania, which is here depicted, Plate No. 4.

In the diagram "A" represents perpendicular posts set in the streams and fastened for the purpose of catching floating material that might otherwise tear or injure the weir below. "B" represents net wings for the capture of creatures running "Down-stream." "C" represents the main or chief net placed entirely across the stream, to prevent passage either way. "D" is a pocket or pen in which fish coming "up-stream" will ultimately be found, being guided by the wings of netting, "E-F."

Are the Susquehanna lamprey a metamorphosis of the sea lamprey? Large ones have been found near Gettysburg and in Perry County, Pennsylvania, or are they a metamorphosis of the Lake (New York) lamprey, because they resemble them, except in color.

The settlement of this question is important on account of the use of the Susquehanna Water Powers at McCall's Ferry and Conowingo. The erection of these two dams have had a serious effect in depriving the Susquehanna river of that valuable migratory food fish, the shad, and that exquisite game fish, "Salmon Salar" or sea salmon, and stopped the lamprey from seeking their initial breeding places further up stream. The Susquehanna river is indeed, but a mighty brook.

The foregoing brief statement of this subject is dictated by the necessity of disseminating some information about bait of various kinds to secure a successful catch of fish by rod or line.

The lamprey (larval) is the best lure for salmon (walleyed-pike). The helgramite, (larval) of the big shad fly with horns called scientifically *Corydalus Cornutus* (Haldeman); for bass, the cray fish or crawfish; for the *Salmo fontalis* or brook trout, which likes it very much, and that "crab" makes the trout's flesh the delicate pink so fascinating to the epicure.

It is well known that the trout will not rise to flies when the water

is roily, because then crabs (crawfish) are washed from among the cress and other aquatic weeds. If you will observe a trout take a crab you will see him seek a shadowy place and no line, lured with bait or fly will tempt him. He is full, like a snake, after swallowing a toad, until it is digested. Bass will take a helgramite with a fish in the stomach, but not another fish. The salmon (wall-eyed-pike), will take the lamprey if he has a fish in his maw but not another fish. Of course these real fish morsels must be large and satisfying. Little fish don't count in some fishes' estimation.

These choice lures have a peculiar relation. The bait is often a natural enemy to the fish lured. The salmon attacks the lamprey in the larval state but when the lamprey arrives at maturity, through "Transformation," it attacks his enemy "in the fifth rib" under the pectoral fin and sucks his life blood. He treats "suckers" and "catties" the same way because they hunt lamprey spawn and fry in the sand and mud. Shad are often attacked by the sea lamprey in the lower waters of the Susquehanna river.

Recently a very interesting paper was published upon photographing fishes in the bodies of water in which they were naturally found, showing several sorts of fish that construct nests. See Photograph 3. (Bull: Bureaux (U. S.) Fisheries Vol. XXXVIII. Plate CXVI, Fig. 6, p. 1113—Prof. Jacob Reigard), in lakes and rivulets, and it is to be presumed that they do for special protection against enemies in the instinctive efforts to secure a survival of the species.

All animals must instinctively have the ability to defend their young in their nests, if not it must be done for them by protective legal measures or multitudinous procreation. It is evident the *unit* reproduction like the *Human Animal* needs the highest possible protection, even all his life by administrative Government, and it has evolved into an intelligent care of his wild or inherent and natural appetite and seeks to restore his maintenance capacity from the teeming aquatic sources of it. Hence the liberal public appropriations conserve game animals, fish, etc., for his use. One of the responsibilities of "domination of creation" by man is the proper preservation (Genesis 1. v. 28) of species for food-service and propagation or continuance.

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#### A CHECK LIST OF THE FISHES RECORDED FROM PENNSYLVANIA.

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By Henry W. Fowler.

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*The Academy of Natural Sciences of Philadelphia.*

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The present account is an attempt to give a list of the species of fishes known from the limits of this State, together with all the localities at which each has been obtained. Only such records as have already been published are given, no new ones being added. This

task has involved much labor and time, and, it is hoped, will prove satisfactory in the prosecution of further studies in geographical distribution.

Unfortunately, the first account of the fishes of Pennsylvania, written by Cope, is composed of the species of fishes "known or supposed to exist in its waters." Confusion often arises from this fact. A number of species are thus included as they were thought to prove inevitably members of the fauna, simply because of their distribution in waters adjacent to the limits of Pennsylvania. While it is in no way contended here that they may not, or even do not, occur, I shall be forced to consider them inadmissible until they are discovered. Thus they are omitted here without further mention.

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#### The LAMPREYS (Cyclostomes).

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##### Family PETROMYZONIDÆ (Lampreys).

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*Petromyzon marinus Linnaeus*.—Lamprey, "Sea Lamprey," "Lammer Eel," "Nine Eyes."

Ascends streams of the Atlantic Slope in the spring, when it is often found attached to shad, herring, or other large fishes.

*Delaware River Basin* (Stock Grange, Holmesburg, Torresdale, Hulmeville, Bristol, Morrisville, Dingman's Ferry).

*Susquehanna River Basin* (York Furnace, Lancaster County, and Juniata River).

*Ichthyomyzon concolor* (Kirtland).—River Lamprey, Silver Lamprey.

Lives in our western rivers, or those of the Mississippi Valley and Great Lake Region. Ascends small brooks in the spring.

*Allegheny River Basin* (Kiskiminetas River, Two Lick, Rainsley's, Cherry and McKenny's Runs, and Port Allegany).

*Lampetra aepyptera* (Abbott).—Brook Lamprey, Small Black Lamprey.

Like the last a native of our western rivers and lakes, and ascends small streams in the spring. Rare in Pennsylvania.

*Ohio River Basin* (far as Pittsburgh).

*Allegheny River Basin* (Port Allegany).

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#### The FISHES (Teleostomi).

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##### Family ACIPENSERIDÆ (Sturgeons).

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*Acipenser sturio* Linnaeus.—Sturgeon, Common Sturgeon, Long-nosed Sturgeon.

A large and valued food-fish, living in the larger waters of the Atlantic Slope. Though formerly abundant, now scarce.

*Delaware River Basin* (Philadelphia, Bridesburg, Tacony, Holmesburg, Torresdale, Cornwells, Bristol, Tullytown, Easton).

*Acipenser rubicundus* (Le Sueur).—Lake Sturgeon, Rock Sturgeon, Red Sturgeon.

In our State only west of the Alleghenies, though now rare in most of our rivers. Valued as a food-fish.

*Ohio River Basin.*

*Lake Erie.*

*Acipenser brevirostrum* Le Sueur.—Short-nosed Sturgeon.

A small species, usually known as "mouche" by the fishermen, though this name is also sometimes applied to the young of any sturgeon. Rare, or not frequently captured.

*Delaware River Basin* (Torresdale and Bristol).

*Scaphirhynchops platorynchus* (Rafinesque).—Shovel-nosed Sturgeon, White Sturgeon.

Found in rivers west of the Alleghenies, though now rare.

*Ohio River Basin* (far as Pittsburgh).

#### Family POLYODONTIDÆ (Paddle Fishes).

*Polyodon spathula* (Walbaum).—Paddle Fish, "Spoon-billed Sturgeon," "Duck-billed Cat."

A large species, remarkable for the long paddle-like snout. Found in the waters west of the Alleghenies. Not valued for food, as its flesh is of coarse inferior quality.

*Ohio River Basin* (Monongahela River, Allegheny River, Pittsburgh, Kiskiminitas River, Foxburg, Corydon).

#### Family LEPISOSTEIDÆ (Gar Pikes).

*Lepisosteus huronensis* (Richardson).—Lake Gar Pike.

This, and the two following, not valued as food, and also very destructive to other fishes. The Lake Gar Pike has only been found west of the Alleghenies.

*Ohio River Basin* (Monongahela River, Allegheny River, Warren).

*Lepisosteus osseus* (Linnaeus).—Catesby's Gar Pike.

Differs but very slightly from the preceding. Known only in our streams of the Atlantic Slope.

*Delaware River Basin* (Bristol, Morrisville).

*Susquehanna River Basin* (Lancaster County).

*Cylindrostomus platostomus* (Rafinesque).—Short-nosed Gar.

Found in waters west of the Alleghenies.

*Ohio River Basin* (far as Pittsburgh).

#### Family AMIATIDÆ (Bowfins).

*Amiatus calvus* (Linnaeus).—Bowfin, Mudfish, Dogfish.

Found mostly west of the Alleghenies, usually sluggish in habits,

though quite voracious, and gamy when angled. Its flesh is not valued as food.

*Susquehanna River Basin* (Safe Harbor).

*Ohio River Basin* (Allegheny City).

*Lake Erie* (Erie).

#### Family HIODONTIDÆ (Moon-Eyes).

*Hiodon alveoides* (Rafinesque).—Gold-eye.

Occurs in waters west of the Alleghenies. Said to be a good food-fish. Rare.

*Ohio River Basin* (Beaver River, Youghiogheny River).

*Hiodon tergisus* Le Sueur.—Moon-eye.

A beautiful silvery fish, not valuable as food. Occurs west of the Alleghenies.

*Ohio River Basin* (Pittsburgh).

*Lake Erie* (Erie).

#### Family CLUPEIDÆ (Herrings).

*Pomolobus chrysocloris* Rafinesque.—Inland Alewife.

Found in large bodies of water west of the Alleghenies, though not valued as food.

*Ohio River Basin* (Pittsburgh).

*Pomolobus pseudoharengus* (Wilson).—Alewife, "Herring," "Sawbelly."

Abundant in the spring, ascending our coastwise streams, or those of the Atlantic Slope, in great numbers. Valued as a food-fish, and along with the shad, the object of extensive fisheries.

*Delaware River Basin* (Tinicum, Philadelphia, Tacony, Holmesburg, Torresdale, Cornwells, Corydon, Bristol, Tullytown, Scott's Creek, Morrisville).

*Susquehanna River Basin* (York Furnace and Lancaster County).

*Pomolobus astivalis* (Mitchill).—Summer Herring, "Blackbelly."

Abundant, though running a little later into our tidal waters of the Atlantic Slope. Not always distinguished by the fishermen from the preceding.

*Delaware River Basin* (Bristol).

*Alosa sapidissima* Wilson.—Shad.

Justly the most famous and valued of all our food-fishes. Ascends our tidal streams in the spring, though formerly running up to the very head-waters of our larger rivers.

*Delaware River Basin* (Tinicum, League Island, Tacony, Holmesburg, Cornwells, Bristol, Tullytown, Philadelphia, below Fairmount Dam, Falls of Schykill, Delaware Water Gap, Dingman's Ferry).

*Susquehanna River Basin* (Peach Bottom, McCall's Ferry, York Furnace, Lancaster County).

## Family DOROSOMIDÆ (Gizzard Shad).

*Dorosoma cepedianum* (Le Sueur).—Gizzard Shad, "Mud Shad." Found locally in our larger bodies of lowland waters, and not valued as food.

*Delaware River Basin* (Philadelphia, Torresdale, Cornwells, Bristol, Tullytown).

*Ohio River Basin* (Monongahela River).

## Family SALMONIDÆ (Salmon).

*Coregonus albus* Le Sueur.—Erie White Fish.

A valued and abundant food-fish.

*Lake Erie* (Erie).

*Coregonus clupeaformis* (Mitchill).—Common White Fish. Like the last.

*Lake Erie* (Erie).

*Leucichthys sisco huronis* (Jordan and Evermann).—Lake Huron Herring.

*Lake Erie* (Erie).

*Leucichthys artedi* (Le Sueur).—Cisco.

Abundant in the Great Lake region. Valued as food.

*Lake Erie* (Erie).

*Cristivomer namaycush* (Walbaum).—Lake Trout, Togue, Salmon Trout.

A large and valued food-fish, though less sought by anglers than the next. Found in waters west of the Alleghenies.

*Lake Erie* (Erie).

*Salvelinus fontinalis* (Mitchill).—Brook Trout, Speckled Trout, Trout.

The most valued of all our game-fishes by those interested in angling. Its distribution is general in most all of our upland waters.

*Delaware River Basin* (Chester County, Port Kennedy, Newgarden, Minersville, Pike County, Milansville, Lackawaxen, Shohola, Masthope, Calicoon Creek, Canadensis, Cresco, Henryville).

*Susquehanna River Basin* (York Furnace, Lancaster County, Trout Run, Huntingdon County, Cambria County, Sullivan County, Lopez, Luzerne County, Centre County, Mifflin County, Newton Hamilton, Sugar Valley Run, Blair County, Bedford County, Cumberland County, Bowman's Creek, Tunkhannock).

*Ohio River Basin* (Monongahela River, Laurel Hills, Youghiogheny River, Two Licks Creek, Ramsey's Run, Bridgeport, Warren, Port Allegany, Seven Bridges).

*Genesee River Basin* (Gold).

## Family ARGENTINIDÆ (Smelts).

*Osmerus eperlanus* Linnaeus.—Smelt.

Occasional in streams of our Atlantic Slope. A good food-fish, though found in too small numbers in our limits to permit of more than very local fishing.

*Delaware River Basin* (Schuylkill River at Philadelphia, and Bristol).

## Family ANGUILIDÆ (Eels).

*Anguilla chrysypa* Rafinesque.—Eel.

This well known and valuable food-fish is abundant throughout all the waters of our State.

*Delaware River Basin* (Timicum, Long Neck, Darby Creek, League Island, Valley Forge, Gladwyne, Frankford, Tacony, Holmesburg, Bustleton, Torresdale, Cornwells, Croydon, Hulmeville, near Langhorne, Bridgetown, Newtown, Etterton, Long Pond, Mill Creek, Guinea Creek, Bristol, Tullytown, Scott's Creek, Morrisville, Dingman's Ferry).

*Susquehanna River Basin* (Lancaster County, McCall's Ferry, York Furnace, Cambria County, Newton Hamilton, Spring and Bald Eagle Creeks in Centre County, Galeton).

*Ohio River Basin*.

*Lake Erie Basin*.

## Family CYPRINIDÆ (Minnows).

*Campostoma anomalum* (Rafinesque).—Stone Roller, Stone Totter, Dough Belly, Mammy.

Usually found in small streams in more or less quiet water. Ascends small brooks in the spring, for the purpose of spawning. Reaches about eight inches in length, and not much valued as bait or food. Found only west of the Alleghenies.

*Ohio River Basin* (Pigeon Creek and Lock No. 9 on Monongahela River, Youghiogheny River, Shenango River at Jamesburg, Beaver River, Newcastle, Kiskiminitas River, Port Allegheny, Cole Grove, and Indiana County in the following localities: Cowanshannoe, Grant Township, Pine Township, Two Lick Creek, North Branch of Two Lick Creek, Pine Creek, Susquehanna Creek, Big Mahoning Creek, Little Mahoning Creek, Ramsey's Run, McKenny Run, Home Run, Burnhamer Run, Rock Run, Saltgiver Run, Basnham Run, Broad Head Run, Smiten Run, Martin's Run, Mud Lick Run, Smicksburg Run, Groft's Run, McCormick's Run, Ross Run, Elder's Run, Little Run, Pickering Run).

*Chrosomus erythrogaster* (Rafinesque).—Red-bellied Dace.

A beautiful little fish, and very attractive in the aquarium. Spring males are most brilliantly marked with black, orange, scarlet and olive. It is valued as bass bait. Found in cold brooks west of the Alleghenies.

*Ohio River Basin* (tributaries of the Allegheny River, Kiskiminitas River).

*Chrosomus erythrogaster eos* (Cope).—Eastern Red-bellied Dace. Known only from four examples, differing from the preceding in color.

*Susquehanna River Basin* (Meshoppen Creek in Susquehanna County).

*Hybognathus nuchalis* Agassiz.—Silvery Minnow.

A pale graceful silvery-white species, living in streams west of the Alleghenies. It seldom, or rarely, attains six inches in length.

*Ohio River Basin*.

*Hybognathus nuchalis argyritis* (Girard).—Big-mouthed Silvery Minnow.

Closely resembles the preceding, but differs in the much larger maxillary. Found west of the Alleghenies and reaches four inches in length.

*Ohio River Basin* (Kiskiminitas River).

*Myogobius nuchalis regius* (Girard).—Eastern Silvery Minnow, Smit Minnow, Gudgeon.

A beautiful fish, reaching seven inches in length, and perhaps more, as alleged. Common in fresh tidal regions of our eastern waters.

*Delaware River Basin* (Tacony, Holmesburg, Torresdale, Cornwells, Hulmeville, Neshaminy Falls, Bristol).

*Pimephales promelas* Rafinesque.—Black-headed Minnow.

A small minnow about three inches long, living in sluggish waters, variable with age, sex and season. Found only west of the Alleghenies.

*Ohio River Basin* (Port Allegany).

*Pimephales Notatus* (Rafinesque).—Blunt-nosed Minnow.

Similar to the last, though the adult with the lateral line complete. Found in all our waters, abundant, tenacious, and valued as bait.

*Delaware River Basin* (Valley Forge and Schuylkill River, near mouth of Mill Creek in Montgomery County).

*Susquehanna River Basin* (York Furnace and Altoona).

*Ohio River Basin* (Monongahela River, Port Allegany, Cole Grove, Foxbur, and the following localities in Indiana County. Cowanshano, Grant Township, Pine Township, Two Lick Creek, North Branch of Two Lick Creek, Susquehanna Creek, Big Mahoning Creek, Little Mahoning Creek, Crooked Creek, Ramsey's Run, Harris' Run, Cherry Run, Marsh Run, McKenney Run, Home Run, Burnhamer Run, Besham Run, Smit Run, Martin's Run, Mud Lick Run, Smicksburg Run, Groft's Run, McCormick's Run, Ross Run, Elder's Run, Little Run, Pickering Run, Crooked Run).

*Semotilus bullaris* (Rafinesque).—Fall Fish, Chub.

The largest and gamiest of all our minnows, occasionally reaching a length of but little less than two feet. Very variable, age, sex, and season forming great contrasts. Found only east of the Alleghenies, or in streams of the Atlantic Slope.

*Delaware River Basin* (Kennett Square, Mendenhall, Ring's Run, Willistown Barrens, Reese's Run, Crum Creek, Markam, Collar Brook, Darby Creek, Naylor's Run, Perkiomen Creek, Tacony, Holmesburg, Bustleton, Huntington Valley, Walnut Hill, Byberry,

Torresdale, Cornwells, Croydon, Hulmeville, Langhorne, Neshaminy Falls, Newtown, Long Pond, Etterton, Bristol, Tullytown, Delaware Water Gap, Dingman's Ferry).

*Susquehanna River Basin* (Lane: County, Conestoga Creek, Nottingham, Cambria County, Newton Hamilton, Emporium).

*Semotilus atromaculatus* (Mitchill).—Creek Chub, Horned Chub, Horned Dace.

A very abundant species in all our upland waters, especially the small clear brooks, where it is often the largest and most voracious inhabitant. It reaches a length of about ten inches, and is valued mostly as bait. Very variable with age, sex and season.

*Delaware River Basin* (Kennett Square, Mendenhall, Ring's Run, tributaries of Brandywine below Chadd's Ford Junetion, Whetstone Run, Fawkes Run, Darby Creek, Collar Brook, Cobb's Creek, Schuylkill River, Centreville, Gladmyne, Tacony Creek, Holmesburg, Bustleton, Torresdale, Cornwells, Tottam Creek, Croydon, Brookfield Run, Flushing, Hulmeville, Neshaminy Falls, Newtown, Etterton, Bristol, Tullytown, Morrisville, Easton, Dingman's Ferry).

*Susquehanna River Basin* (Lancaster County, Nottingham, Ephrata, Trout Run, Hacker's Run, Swamp Bridge, Denver, Bainbridge, Altoona, Sugar Valley Run, Wopsonomick Valley Run, Muney, Emporium).

*Ohio River Basin* (Pigeon Creek in Monongahela River Basin, Youghiogheny River, Meadow Run, Meyersdale).

*Allegheny River Basin* (Beaver River, Foxburg, Warren County, Warren, Port Allegany, Raymonds, Kiskiminitas River, and the following in Indiana County: Cowanshano, Grant Township, Pine Township, Marion Branch, Two Lick Creek, North Branch of Two Lick Creek, Pine Creek, Susquehanna Creek, Crooked Creek, Little Mahoning Creek, Ramsey's Run, Harris' Run, Cherry Run, Marsh Run, Wehrle's Run, Simpson's Run, McKenney Run, Burnhamer Run, Besham Run, Rock Run, Heilman Run, Smit Run, Martin's Run, Mud Lick Run, Smicksburg Run, Groft's Run, McCormick's Run, Ross Run, Elder's Run, Little Run, Pickering Run, Crooked Run).

*Genesee River Basin* (Gold in Potter County).

*Lake Erie Basin*.

*Leuciscus vandoisulus* Valenciennes.—Rosy-sided Dace.

A small species about four inches in length, and ornamental as an aquarium fish. It lives in small clear brooks, in streams east of the Alleghenies, and local in its distribution.

*Delaware River Basin* (White Clay Creek in Chester County).

*Susquehanna River Basin* (Lancaster County, Octoraro Creek, Nottingham, Emporium).

*Leuciscus elongatus* (Kirtland).—Western Rosy-sided Dace.

Differs from the former chiefly in its more slender pointed head. Found in small clear streams west of the Alleghenies.

*Ohio River Basin* (Meadville, Port Allegany, Cole Grove, Two Lick Creek, North Branch of Two Lick Creek, Pine Creek, Susquehanna Creek, Crooked Creek, Marion Branch, Pine Township, Ramsey's Run, Harris' Run, Simpson's Run, Ross Run, Cherry Run, McKenney Run, McCormick's Run, Mud Lick Run, Smicksburg Run, Groft's Run, Allen Run, Home Run, Burnhamer Run, Besham Run,

Ross Run, Rock Run, Salegiver Run, Broad Head Run, Elder's Run, Little Run, Crooked Run, Smitten Run, Pickering Run, Martin's Run).

*Leuciscus margarita* (Cope).—Pearl Dace.

A little known and apparently quite local species. Subsequent records to the original are doubtful.

*Susquehanna River Basin* (tributary of Conestoga Creek near Lancaster, the Branch, Spring Creek, Bald Eagle Creek).

*Ohio River Basin* (Cole Grove in McKean County).

*Abramis crysoleucas* (Mitchill).—Bream, Roach, Shiner.

A very abundant and familiar species, living mostly in quiet waters. Valued as bait, and sometimes as a pan-fish, as it reaches a foot in length occasionally. Distributed in all our waters.

*Delaware River Basin* (Kennett Square, Mendenhall, Ring's Run, Willistown Barrens, Chadd's Ford, Junction, Taylor's Run, Hunter's Run, Long Neck, Collingdale, Naylor's Run, Tinicum, Darby Creek, Valley Forge, Gladwyne, Tacony Creek, Holmesburg, Bustleton, Hatboro, Torresdale, Cornwells, Croydon, Hulmeville, Langhorne, Neshaminy Falls, Newtown, Bristol, Emelie, Guinea Creek, Tullytown, Scott's Creek, Morrisville, Yardly, Easton, Daleville, Dingman's Ferry).

*Susquehanna River Basin* (Lancaster County, Witmer's Mills, Swamp Bridge, Denver, Cambria County, York Furnace, Nottingham, Lopez, Emporium).

*Ohio River Basin*.

*Lake Erie Basin* (Erie).

*Ceratichthys vigilax* Baird and Girard.—Chiola Minnow. Occurs west of the Alleghenies.

*Ohio River Basin* (Monongahela River).

*Notropis bifrenatus* (Cope).—Bridled Minnow.

Abundant east of the Alleghenies. Distinguished from all the others of its genus by the lateral line incomplete or slightly developed at all ages.

*Delaware River Basin* (Ring's Run, Black Horse Run, Chadd's Ford, Collingdale, Naylor's Run, Valley Forge, Conshohocken, Holmesburg, Bustleton, Hatboro, Torresdale, Cornwells, Croydon, Hulmeville, Neshaminy Falls, Langhorne, Newtown, Little Neshaminy Creek, Etterton, Long Pond, Wycombe, Bristol, Magnolia, Emelie, Guinea Creek, Scott's Creek, Easton).

*Susquehanna River Basin* (York Furnace).

*Notropis boops* Gilbert.—Big-eyed Minnow.

Known only from west of the Alleghenies.

*Allegheny River Basin* (Foxburg).

*Notropis dellicoccus* (Girard).—Dainty Minnow.

Occurs west of the Alleghenies.

*Ohio River Basin* (Monongahela River and Ross Run in Indiana County).

*Notropis proene* (Cope).—Swallow Minnow.

Abundant in clear and not too rapid streams, east of the Alleghenies. A pretty little fish, hardy in the aquarium, and valued as bait.

*Delaware River Basin* (White Clay Creek, Philadelphia, Schuylkill River, Abrams, Collingdale, Holmesburg, Bristol, Hulmeville, Newtown, Neshaminy Falls, Etterton, Long Pond, Wycombe).

*Susquehanna River Basin* (Lancaster County, Conestoga Creek, Nottingham, Paradise, Swamp Bridge, Witmer's Mills, Blainsport).

*Notropis kalmi* Fowler.—Allegheny Minnow.

Rare, and only known from west of the Alleghenies.

*Allegheny River Basin* (Port Allegheny and Cole Grove).

*Notropis hudsonius* (Clinton).—Spot-tailed Minnow.

Found west of the Alleghenies, in Pennsylvania. Differs from the next in the ever-present black caudal spot. Valued as bait.

*Ohio River Basin* (Monongahela River and Cole Grove).

*Lake Erie Basin* (Erie).

*Notropis hudsonius amarus* (Girard).—Eastern Spot-tailed Minnow, Gudgeon, Spawn-eater.

Abundant in streams east of the Alleghenies. A good bait-fish, reaching six inches in length.

*Delaware River Basin* (Brandywine Creek, Black Horse Run, Ring's Run, Chadd's Ford, Holmesburg, Bustleton, Torresdale, Croydon, Hulmeville, Neshaminy Falls, Langhorne, Bridgetown, Etterton, Langhorne, Bristol, Dingman's Ferry).

*Susquehanna River Basin* (Lancaster County, Conestoga Creek, Paradise, Denver, Witmer's Mills, The Branch, Spring Creek).

*Notropis whippili* (Girard).—Silver-fin.

Lives in the clear waters of the Ohio Valley and Lake Erie. A good bait-minnow, reaching four inches.

*Ohio River Basin* (Monongahela River, Youghiogheny River, Kiskiminitas River, Cole Grove).

*Lake Erie Basin* (Erie).

*Notropis whippili analostanus* (Girard).—Eastern Silver-fin, Blue Minnow.

Perhaps the most abundant species in the State. It occurs east of the Alleghenies. Spawning-males are beautifully ornate with white or satin-white pigment. Valued as bait.

*Delaware River Basin* (Keunett Square, below Chadd's Ford, Junction, Crossart, Ring's Run, Chadd's Ford, Brandywine Summitt, Concordville, Markham, Darby Creek, Collingdale, Philadelphia, Schuylkill River, Conshohocken, Abrams, Gladwyne, Valley Forge, Barren Hill, Hatboro, Jenkintown, Walnut Hill, Bustleton, Holmesburg, Byberry, Torresdale, Cornwells, Croydon, Hulmeville, Neshaminy Falls, Little Neshaminy Creek, Langhorne, Etterton, Long Pond, Wycombe, Newtown, Bristol, Magnolia, Emelie, Tullytown, Scott's Creek, Morrisville, Dingman's Ferry).

*Susquehanna River Basin* (York Furnace, Lancaster County, Paradise, Trout Run, Akron Run, Ephrata, Denver, Swamp Bridge, Conestoga Creek, Octorara Creek, Bainbridge, Witmer's Mills, Blainsport, Juniata River, Newton Hamilton, Altoona, Meshoppen Creek, Elk Creek).

*Notropis cornutus* (Mitchill).—Red-fin, Horned Shiner.

Very abundant and living in all our waters. It attains an average maximum length of eight inches, and valued as bait, also sometimes as a pan-fish.

*Delaware River Basin* (Kennett Square, Mendenhall, Ring's Run, Brandywine Creek below Chadd's Ford Junction, Crossart, Black Horse Run, Mill Run, Willistown Barrens, White Horse, Reese's Run, Darby Creek, Collar Brook, Whetstone Run, Langford's Run,

Lewis' Run, Markam, Wawa, Naylor's Run, Schuylkill River, Abrams, Barren Hill, Hatboro, Valley Forge, Tacony Creek, Holmesburg, Bustleton, Beth Ayres, Walnut Hill, Byberry, Torresdale, Cornwells, Tottam Creek, Croydon, Flushing, Hulmeville, Neshaminy Falls, Langhorne, Bridgetown, Etterton, Long Pond, Wycombe, Newtown, Little Neshaminy Creek, Chalfont, Bristol, Tullytown, Morrisville, Easton, Belfast, Dingman's Ferry).

*Susquehanna River Basin* (Nottingham, Lancaster County, Conestoga Creek, Paradise, Denver, Swamp Bridge, Ephrata, Trout Run, Witmer's Mills, Snoekstown Run, Carlisle, Cambria County, Bald Eagle Creek, Wilkes-Barre, Muncy, Raystown Creek, Meshoppen Creek, Elk Creek).

*Ohio River Basin* (Youghiogheny River, Allegheny River, Newcastle, Cole Grove, Corydon, Port Allegany, Kiskiminitas River and the following in Indiana County: Cowanshano, Two Lick Creek, North Branch of Two Lick Creek, Big Mahoning Creek, Little Mahoning Creek, Grant Township, Pine Township, Ramsey's Run, Cherry Run, Crooked Run, Burnhamer Run, Besham Run, Saltgiver Run, McCormick's Run, Ross Run, Broad Head Run, Elder's Run, Little Run, Groft's Run, Mud Lick Run, Smicksburg Run, Smitten Run, Hileman Run, Pickering Run).

*Lake Erie Basin* (Erie).

*Notropis chalybaeus* (Cope).—Iron-colored Minnow.

A brilliant little minnow, living mostly in quiet water. Found only east of the Alleghenies in the lowlands.

*Delaware River Basin* (Conshohocken, Bristol, Emelie, Neshaminy Falls, Newtown).

*Notropis jejonus* (Forbes).—Hungry Minnow.

Only found west of the Alleghenies.

*Ohio River Basin* (Lock No. 9 Monongahela River).

*Notropis atherinoides* Rafinesque.—Emerald Minnow.

A handsome species, reaching six inches in length. Found west of the Alleghenies.

*Ohio River Basin* (Beaver River, Monongahela River, Two Lick Creek, Cherry Run).

*Lake Erie Basin* (Erie).

*Notropis rubrifrons* (Cope).—Red-faced Minnow.

A small species, living in clear streams west of the Alleghenies.

*Ohio River Basin* (Pigeon Creek in Monongahela River Basin, Kiskiminitas River, Pickering Run, and Big Mahoning Creek).

*Notropis photogenis* (Cope).—White-eyed Minnow.

A silvery species reaching three inches in length. Found west of the Alleghenies.

*Ohio River Basin* (Youghiogheny River and Cherry Run in Indiana County).

*Notropis photogenis amoenus* (Abbott).—Eastern White-eyed Minnow, Attractive Minnow.

A bright silvery little species, found in streams east of the Alleghenies.

*Delaware River Basin* (Holmesburg, Hulmeville, Neshaminy Falls, Langhorne, Bridgetown, Bristol, Magnolia, Emelie, Dingman's Ferry).

*Susquehanna River Basin* (Paradise Swamp Bridge, Denver, Bald Eagle Creek).

*Ericympa buccata* Cope.—Scalloped Minnow.

A silvery little minnow, remarkable for its cavernous cheeks and jaws. Found in clear streams and ponds west of the Alleghenies.

*Ohio River Basin* (Monongahela River, Kiskiminitas River, Two Lick Creek, North Branch of Two Lick Creek, Cherry Run, Ramsey's Run, Pickering Run, Burnhamer Run, Besham Run, Mud Lick Run, Groft's Run, Ross Run, Elders Run, Little Run, Smitten Run, Crooked Run, Pine Township).

*Rhinichthys cataractae* (Valenciennes).—Long-nosed Dace.

A vigorous minnow, reaching five inches in length, living in clear, swift streams, in all our waters. Valued as bait.

*Delaware River Basin* (Kennett Square, White Clay Creek, Mendenhall, Mill Run, Easton).

*Susquehanna River Basin* (Lancaster County, Safe Harbor, Paradise, The Branch, Spring Creek, Altoona, Emporium).

*Ohio River Basin* (Ohio Pyle).

*Rhinichthys atronasus* (Mitchill).—Black-nosed Dace.

Very abundant, and characteristic of all small cold brooks, especially in mountainous regions. Valued as bait.

*Delaware River Basin* (Kennett Square, Mendenhall, Ring's Run, Black Horse Run, Stock Grange, Willistown Barrens, Chadd's Ford, Junction, Crossart, Chadd's Ford, Reese's Run, White Horse, North Branch of Langford's Run, Lewis' Run, Collar Brook, Collingdale, Darby Creek, Wawa, Whetstone Run, Ridley Creek, Cobb's Creek, Central Square, Naylor's Run, Schuylkill River, Abrams, Wissahickon Creek, Barren Hill, Hatboro, Gladwyne, Centerville, Tacony Creek, Holmesburg, Bustleton, Beth Ayres, Walnut Hill, Byberry, Torresdale, Cornwells, Croydon, Hulmeville, Neshaminy Falls, Little Neschaminy Creek, Chalfont, Newtown, Langhorne, Etterton, Flushing, Long Pond, Brookfield Run, Wycombe, Bristol, Tullytown, Morrisville, Easton, Brooklyn, Belfast, Dingman's Ferry, Daleville).

*Susquehanna River Basin* (North East Creek, Octoraro Creek, Nottingham, Lancaster County, Paradise, Bainbridge, Cambria County, Ephrata, Denver, Akron Run, Trout Run, Witmer's Mills, Blainsport, The Branch, Spring Creek, Bald Eagle Creek, York Furnace Lopez, Galeton, Emporium, Sugar Valley Run, Wopsonomick Run, Altoona).

*Ohio River Basin* (Pigeon Creek in Monongahela River Basin, Youghiogheny River, Meyersdale, Port Allegany, Cole Grove, Coudersport, Raymonds, Warren, Ohio Pyle, Beaver River, Kiskiminitas River and the following in Indiana County: Cowanshano, Marion Branch, Pine Township, Grant Township, Two Lick Creek, Pine Creek, Susquehanna Creek, Big Mahoning Creek, Crooked Creek, McCormick's Creek, Ramsey's Run, Marsh Run, Wehrle's Run, Cherry Run, McKenny Run, Rock Run, Allen's Run, Home Run, Burnhamer Run, Besham Run, Saltgiver Run, Broad Head Run, Elders Run, Mud Lick Run, Little Run, Simpson's Run, Groft's Run, Smitten Run, Pickering Run, Martin's Run, Crooked Run).

*Genesee River Basin* (Gold in Potter County).

*Potomac River Basin* (Cove Creek in Fulton County).

*Lake Erie Basin*.

*Hybopsis dissimilis* (Kirtland).—Spotted Chub.

Reaches six inches in length, and lives in the channels of larger streams west of the Alleghenies.

*Ohio River Basin* (Youghiogheny River, Monongahela River).

*Hybopsis storarianus* (Kirtland).—Storer's Chub.

Reaches ten inches in length, and found in the larger streams west of the Alleghenies.

*Ohio River Basin* (Monongahela River).

*Hybopsis kentuckiensis* (Rafinesque).—Horned Chub, Horny-head, River-jerker.

Valued mostly as bait. Found in streams both east and west of the Alleghenies, though not definitely recorded from the Delaware. Reaches ten inches in length.

*Susquehanna River Basin* (York Furnace, Lancaster County, Conestoga Creek, Denver, Bainbridge, Bald Eagle Creek, Elk Creek, Emporium).

*Ohio River Basin* (Youghiogheny River, Ohio Pyle, Beaver River, Kiskiminitas River, Two Lick Creek, Ramsey's Run, Cherry Run, Newcastle, Allegheny River, Warren, Port Allegany).

*Eryglossum maxillingua* (Le Sueur).—Cut-lips Chub.

Reaches six inches in length, and remarkable among all our fishes for its peculiar three-lobed lower jaw. Found in clear running streams.

*Delaware River Basin* (Mendenhall, Red Clay Creek, Black Horse Run, Mill Run, Valley Forge, Schuylkill River).

*Susquehanna River Basin* (Lancaster County, Paradise, Denver, Witmer's Mills, Cambria County, York Furnace, Carlisle, Hollidaysburg, Bainbridge, Juniata River, Spring Creek, Bald Eagle Creek, Emporium, Altoona, Lopez, North Branch of Susquehanna).

*Ohio River Basin* (Cole Grove, Port Allegany).

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Family CATOSTOMIDÆ (Suckers).

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*Cyclopterus elongatus* (Le Sueur).—Black Horse.

A large species, reaching thirty inches, living in streams west of the Alleghenies.

*Ohio River Basin* (Ohio River far as Pittsburgh, Allegheny River, Kiskiminitas River).

*Ictalurus bubalus* (Rafinesque).—Small mouthed Buffalo Fish.

Found west of the Alleghenies, and not valued as food.

*Ohio River Basin* (Ohio River far as Pittsburgh).

*Carpioles thompsoni* Agassiz.—Lake Carp Sucker.

Not valued as a food fish, though reaching a weight of five pounds. Occurs west of the Alleghenies.

*Lake Erie Basin* (Erie).

*Carpioles cyprinus* (Le Sueur).—Eastern Carp Sucker, Silver Carp.

The only one of its genus occurring east of the Alleghenies. Not much valued as food.

*Susquehanna River Basin* (Conestoga Creek).

*Carpioles cutisanserinus* Cope.—Rough-nosed Carp Sucker.

Like the last, about a foot long, though only found west of the Alleghenies.

*Ohio River Basin* (Kiskiminitas River, Allegheny River).

*Carpioles velifer* Rafinesque.—Carp Sucker, Quillback, Spearfish.

A small species, about a foot long, living in streams west of the Alleghenies.

*Ohio River Basin* (Ohio River as far as Pittsburgh, Monongahela River, at Lock No. 3, and Monongahela City).

*Catostomus catostomus* (Forster).—Long-nosed Sucker.

Distinguished from all of our other suckers by its extremely fine or small scales. A species of the northwest, reaching a length of thirty inches.

*Ohio River Basin* (Youghiogheny River).

*Catostomus commersonnii* (Lacépède).—Common Sucker.

Our most abundant species, and reaches a length of about eighteen inches. Found in all our waters.

*Delaware River Basin* (Kennett Square, Mendenhall, Ring's Run, Hunter's Run, Castle Rock, Tinicum, Ridley Creek, Darby Creek, Cobb's Creek, Naylor's Run, Gladwyne, Valley Forge, Tacony Creek, Hatboro, Beth Ayres, Holmesburg, Bustleton, Walnut Hill, Torresdale, Byberry, Cornwells, Croydon, Hulmeville, Chalfont, Little Neshaminy Creek, Neshaminy Falls, Newtown, Langhorne, Etterton, Long Pond, Wycombe, Guinea Creek, Bristol, Tullytown, Scott's Creek, Morrisville, Easton, Belfast, Delaware Water Gap, Dingman's Ferry).

*Susquehanna River Basin* (North East Creek, Lancaster County, Octoraro Creek, Conestoga Creek, Paradise, Ephrata, Bainbridge, Carlisle, Cambria County, The Branch, Spring Creek, Bald Eagle Creek, Emporium, Wilkes-Barre).

*Ohio River Basin* (Youghiogheny River, Meyersdale, Ohio Pyle, Pigeon Creek in Monongahela Basin, Foxburg, Port Allegany, Cowanshannoc, Marion Branch, Grant Township, Two Lick Creek, North Branch of Two Lick Creek, Pine Creek, Crooked Creek, Ramsey's Run, Cherry Run, Wehrle's Run, Home Run, Mud Lick Run, Smicksburg Run, Groft's Run, Burnhamer Run, Martin's Run, McCormick's Run, Ross Run).

*Lake Erie Basin*.

*Catostomus nigricans* Le Sueur.—Black Sucker.

Said to occur in all our river-basins, though I have not found it in the Delaware. Lives in clear and usually rapid streams, reaching two feet in length.

*Delaware River Basin*.

*Susquehanna River Basin* (Lancaster County, Denver, Octoraro Creek, Paradise, Conestoga Creek, Bainbridge, Cambria County, Altoona, Emporium).

*Ohio River Basin* (Pigeon Creek in Monongahela River Basin, Youghiogheny River, Newcastle, Kiskiminitas River, Two Lick Creek, Cherry Run, McKenny Run, North Branch of Two Lick Creek, Port Allegany).

*Lake Erie Basin*.

*Erimyzon suetta oblongus* (Mitchill).—Chub Sucker, Mullet.

Abundant in all our waters. Reaches eleven inches in length and not valued as food.

*Delaware River Basin* (Kennett Square, Mendenhall, Chadd's Ford Junction, Cheney, Ridley Creek, Darby Creek, Schuylkill River, Gor-

mantowo, Tacony Creek, Holmesburg, Bustleton, Walnut Hill, Hulmeville, Neshaminy Falls, Langhorne, Wycombe, Newtown, Guinea Creek, Tullytown, Morrisville, Easton, Belfast).

*Susquehanna River Basin* (Lancaster County, Witmer's Mills, Centre County, Cambria County, Altoona).

*Ohio River Basin* (Port Allegany).

*Genesee River Basin* (Gold).

*Lake Erie Basin*.

*Moxostoma anisurum* (Rafinesque).<sup>1</sup>—White-nosed Red Horse.

Reaches two feet in length and not valued as a food-fish. Found west of the Alleghenies.

*Ohio River Basin* (Ohio River far as Pittsburgh, Jamestown in Mercer County, Beaver River, Youghiogheny River, Allegheny River).

*Moxostom erythrurum* (Rafinesque).—Red Horse.

Abundant west of the Alleghenies.

*Ohio River Basin* (Youghiogheny River, Beaver River, Kiskiminetas River, Cowanshannoc, Grant Township, Pine Township, Two Lick Creek, Cherry Run, Home Run, Elders Run, Little Run, Big Mahoning Creek, Indiana, Monongahela River).

*Lake Erie Basin* (Erie).

*Moxostom macrolepidotum* (Le Sueur).—Eastern Red Horse.

The only red horse east of the Alleghenies.

*Delaware River Basin*.

*Susquehanna River Basin* (Lancaster County, Conestoga Creek, Carlisle, Cambria County).

*Moxostoma duquesnei* (Le Sueur).—Small-scaled Red Horse.

Streams west of the Alleghenies.

*Ohio River Basin* (Youghiogheny River, Branch of Big Mahoning Creek).

*Moxostoma breviceps* (Cope).—Short-headed Red Horse. Found west of the Alleghenies.

*Ohio River Basin* (Youghiogheny River).

*Placopharynx carinatus* Cope.—Big-jawed Sucker.

A large sucker, reaching thirty inches in length, living in the larger streams west of the Alleghenies.

*Ohio River Basin* (Beaver River).

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Family SILURIDÆ (Catfishes).

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*Ictalurus furcatus* (Valenciennes).—Chuckle-headed Cat.

A large species, reaching over forty pounds weight and found west of the Alleghenies, and valued as food.

*Ohio River Basin* (Lock No. 3 of Monongahela River).

*Ictalurus punctatus* (Rafinesque).—Blue Cat.

An excellent food-fish, reaching twenty-five pounds in weight. West of the Alleghenies.

<sup>1</sup> *Minytrema melanops* (Rafinesque) is listed by Cope and T. H. Bean, hypothetically. Later Ross has recorded it from Spring and Bald Eagle Creeks in Centre County. This is the only record from the northeast of the Alleghenies, and may be questioned, until the material in question is compared and re-examined.

*Ohio River Basin* (Ohio River far as Pittsburgh, Beaver River, Lock No. 9, Monongahela River).

*Ameiurus lacustris* (Walbaum).—Lake Cat.

A valued food-fish of the Great Lakes and streams west of the Alleghenies.

*Lake Erie Basin* (Erie).

*Ameiurus catus* (Linnaeus).—White Cat.

Abundant in large streams east of the Alleghenies, where it is the most valued cat-fish. Reaches about two feet in length.

*Delaware River Basin* (Chester County, Holmesburg, Torresdale, Bristol.)

*Susquehanna River Basin* (York Furnace, Lancaster County, Schenk's Ferry, Conestoga Creek).

*Ameiurus natalis* (Le Sueur).—Yellow Bullhead.

Variable, and though so far only known from west of the Alleghenies. Size rather small or usually less than two feet, though valued as food.

*Ohio River Basin* (Ohio River far as Pittsburgh).

*Lake Erie Basin*.

*Ameiurus nebulosus* (Le Sueur).—Common Cat, Bullhead.

The most abundant of the catfishes. Found in all our waters, and valued as a food-fish. Reaches two feet in length.

*Delaware River Basin* (Kennett Square, Mendenhall, Cheney, Chadd' Ford, Tinicum, Darby Creek, Ridley Creek, Cobb's Creek, Long Neck, Philadelphia, Schuylkill River, Falls of Schuylkill, Gladwyne, Tacony Creek, Jenkintown, Holmesburg, Bustleton, Torresdale, Cornwells, Croydon, Hulmeville, Neshaminy Falls, Chalfont, Newtown, Wycombe, Bristol, Tullytown, Scott's Creek, Morrisville, Dingman's Ferry).

*Susquehanna River Basin* (York Furnace, Lancaster County, Conestoga Creek, North East Creek, Ephrata, Witmer's Mills, Cambria County, Wilkes-Barre).

*Ohio River Basin* (Coudersport, Perryville, Two Lick Creek, Ramsey's Run, Cherry Run, McKenny Run, Simpson's Run).

*Lake Erie Basin*.

*Ameiurus melas* (Rafinesque).—Black Bullhead.

A small black species, found west of the Alleghenies.

*Ohio River Basin*.

*Lake Erie Basin*.

*Gronias nigrilabris* Cope.—Blind Cat.

Known only from a few examples obtained in Eastern Pennsylvania.

*Susquehanna River Basin* (Conestoga Creek near Lancaster).

*Leptops olivaris* (Rafinesque).—Mud Cat.

A large species, living in muddy waters, west of the Alleghenies. Valued as food.

*Ohio River Basin* (Youghiogheny River).

*Noturus flavus* Rafinesque.—Yellow Stone Cat.

The largest of the stone cats, reaching a foot or more in length. Found west of the Alleghenies.

*Ohio River Basin* (Pigeon Creek in Monongahela River Basin, Two Lick Creek, Ramsey's Run, Cherry Run).

*Lake Erie Basin* (Erie).

*Schilbeodes gyrinus* (Mitchill).—Tad-pole Stone Cat.

Found, apparently, in most all our waters. Length five inches. Like the next, valued as bait.

*Delaware River Basin* (Holmesburg, Bristol, Etterton, Long Pond, Tullytown, Delaware Water Gap, Dingman's Ferry).

*Susquehanna River Basin* (Lopez).

*Genesee River Basin* (Gold).

*Schilbeodes insignis* (Richardson).—Margined Stone Cat.

Larger than the last, reaching nearly a foot in length. Found east of the Alleghenies.<sup>1</sup>

*Delaware River Basin* (Schuylkill River, Holmesburg).

*Susquehanna River Basin* (Lancaster County, Conestoga Creek, Bainbridge, Paradise, Cambria County, Altoona, Carlisle, Marsh Run, Bald Eagle Creek, Wyalusing, Emporium).

*Schilbeodes minurus* (Jordan).—Short Stone Cat.

Found west of the Alleghenies. Length four inches.

*Ohio River Basin* (Crooked Creek in Indiana County).

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Family ESOCIDÆ (Pikes).

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*Esox americanus* (Gmelin).—Banded Pickerel.

Abundant east of the Alleghenies. Reaches about a foot, and a good food-fish.

*Delaware River Basin* (White Clay Creek, Kennett Square, Mendenhall, Tinicum, Long Neck, Darby Creek, Tacony Creek, Holmesburg, Torresdale, Cornwells, Neshaminy Falls, Newtown, Guinea Creek, Bristol, Tullytown, Scott's Creek, Morrisville, Penn Valley).

*Susquehanna River Basin* (Lancaster County, Nottingham, Witmer's Mills, Cambria County).

*Esox vermiculatus* (Le Sueur).—Western Pickerel.

A small species, like the last, but only found west of the Alleghenies.

*Ohio River Basin* (Port Allegany and Potter County).

*Esox reticulatus* (Le Sueur).—Chain Pike, "Pickerel."

Lives east of the Alleghenies in Pennsylvania, except where introduced. A valued food and game-fish, reaching about two feet in length.

*Delaware River Basin* (Philadelphia, Rock Hill Pond, Dingman's Ferry).

*Susquehanna River Basin* (Lancaster County, Cambria County, Bald Eagle Creek, Auburn).

*Esox lucius* (Linnaeus).—Pike.

A large food-fish, reaching a length of four feet. In our limits found only west of the Alleghenies.

*Ohio River Basin* (Greenville, Port Allegany, Lake Conneaut, Lake Le Bouef).

*Esox masquinongy* (Mitchill).—Muskallunge.

Reaches eight feet in length, and found in the Great Lake Region.

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<sup>1</sup> My record of this species for Port Allegany may be questioned, until the material is reexamined.

*Lake Erie Basin* (Erie).

*Esox masquinongy ahienensis* (Kirtland).—Ohio River Muskallunge. Differs from the preceding chiefly in color. Reaches five feet. Found in the Ohio Valley.

*Ohio River Basin* (Conneaut Lake, Allegheny River far as Corydon, Warren County, Beaver River).

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Family UMBRIDÆ (Mud Minnows).

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*Umbra limi* (Kirtland).—Western Mud Minnows.

Length about four inches. Lives in muddy ponds or swamps west of the Alleghenies.

*Ohio River Basin* (Meadville).

*Umbra pygmaea* (De Kay).—Eastern Mud Minnows.

Similar to the last, though reaching a length of six inches. Both species are of value as bait, or as food for larger fishes.

*Delaware River Basin* (Kennett Square, Mendenhall, Tinicum, Darby Creek, Philadelphia, Tacony Creek, Holmesburg, Torresdale, Cornwells, Neshaminy Falls, Newtown, Guinea Creek, Bristol, Tullytown, Scott's Creek, Morrisville, Penn Valley).

*Susquehanna River Basin* (Nottingham).

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Family POECILIIDÆ (Killifish).

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*Fundulus heteroclitus macrolepidotus* (Walbaum).—Mummichog. Tidal Killifish.

Very abundant in the tidal regions east of the Alleghenies. Reaches six inches in length, and valuable as a scavenger.

*Delaware River Basin* (Tinicum, League Island, Tacony, Holmesburg, Torresdale, Cornwells, Croydon, Bristol, Tullytown, Scott's Creek, Morrisville).

*Fundulus diaphanus* (Le Sueur).—Barred Killifish.

Common in streams and rivers east of the Alleghenies, though unlike the preceding ascending to the uppermost headwaters. Length four inches.

*Delaware River Basin* (Kennett Square, below Chadd's Ford Junction, Mill Run, Taylor's Run, Ridley Creek, Darby Creek, Gladwyne, Valley Forge, Tacony Creek, Holmesburg, Bustleton, Torresdale, Cornwells, Croydon, Hulmeville, Neshaminy Falls, Newtown, Langhorne, Etterton, Long Pond, Wycombe, Bristol, Scott's Creek, Tullytown, Morrisville, Montgomery County).

*Susquehanna River Basin* (Lancaster County, Cambria County, York Furnace, Paradise, Bald Eagle Creek).

*Fundulus diaphanus menowi* (Jordan and Copeland).—Western Barred Killifish.

Represents the preceding west of the Alleghenies, and differs chiefly in color.

*Ohio River Basin* (Warren County).

## Family BELONIDÆ (Silver Gars).

*Tylosurus marinus* (Walbaum).—Silver Gar, Green Gar.  
Distributed in large rivers east of the Alleghenies. Reaches four feet in length, and a valued food fish.

*Delaware River Basin* (Philadelphia, Bristol).  
*Susquehanna River Basin* (Bainbridge, Pequea).

## Family AETHERINIDÆ (Silversides).

*Labidesthes sicculus* (Cope).—Brook Silverside.  
West of the Alleghenies in quiet water. Length about three and one half inches.  
*Ohio River Basin* (Youghiogheny River).

## Family GASTEROSTEIDÆ (Sticklebacks).

*Eucalia inconstans* (Kirtland).—Brook Stickleback.  
A small species, less than three inches in length, found in fresh water west of the Alleghenies.  
*Ohio River Basin* (Foxburg).  
*Lake Erie Basin* (Erie).  
*Gasterosteus ocellatus* (Linnaeus).—Two-spined Stickleback, Burnstickle.  
Found in our eastern tidal region, reaching a length of four inches.  
*Delaware River Basin* (Philadelphia).  
*Apeltes quadratus* (Mitchill).—Four-spined Stickleback.  
A most abundant little fish in weedy waters east of the Alleghenies. Length but little over two inches.  
*Delaware River Basin* (Tinicum, Tacony, Holmesburg, Torresdale, Cornwells, Croydon, Bristol, Tullytown, Scott's Creek, Morrisville).

## Family PERCOPSIDÆ (Trout Perch).

*Percopsis omiscomaycus* (Walbaum).—Trout Perch.  
Found in streams and lakes west of the Alleghenies, but not in the Delaware. Length six inches, thus too small to be of value as food.  
*Ohio River Basin* (Monongahela River, French Creek, above Franklin).

## Family APHREDODERIDÆ (Pirate Perch).

*Aphredoderus sayanus* (Gilliams).—Pirate Perch.  
A variable little fish, living in sluggish waters east of the Alleghenies. Length five inches.

*Delaware River Basin* (Tinicum, League Island, Harrowgate, Tacony, Holmesburg, Torresdale, Bristol).

## Family CENTRARCHIDÆ (Sunfish).

*Pomoxis annularis* (Rafinesque).—Crappie.  
A fine food-fish, reaching a foot in length. West of the Alleghenies, though introduced in eastern waters.  
*Ohio River Basin* (Monongahela River, Kiskiminitas River).  
*Delaware River Basin* (At Brownsville).  
*Pomoxis sparoides* (Lacépède).—Calico Bass.  
Found in all our waters, especially where clear. Valued as a game and food-fish. Length about a foot.

*Delaware River Basin* (Torresdale).

*Susquehanna River Basin*.

*Ohio River Basin* (Monongahela River).

*Ambloplites rupestris* (Rafinesque).—Red-eyed Bass, Rock Bass.  
An abundant species, though originally only found west of the Alleghenies. Valued as a food and game-fish. Length about a foot.  
*Ohio River Basin* (Pigeon Creek, Monongahela River, Beaver River, Port Allegany, Warren, Kiskiminitas River, Two Lick Creek, Ramsey's Run, Simpson's Run, Cherry Run).

*Susquehanna River Basin* at Wrightsville.

*Delaware River Basin* at Flat Rock Dam, Conshohocken, Pawling's Bridge, Brandywine Creek.

*Enneacanthus gloriosus* (Holbrook).—Blue-spotted Sunfish.

A variable little fish, found in lowland streams east of the Alleghenies. Apparently but a single species, the so-called "Sphagnum Sunfish" being but a local variety. Length, three inches.

*Delaware River Basin* (League Island, Philadelphia, Holmesburg, Torresdale, Bristol).

*Susquehanna River Basin* (Conestoga Creek).

*Mesogonistius chætodon* (Baird).—Banded Sunfish.

One of the most attractive and ornamental of aquarium fishes. Found only east of the Alleghenies. Length four inches.

*Delaware River Basin* (Bristol, Magnolia, Holmesburg).

*Lepomis auritus* (Linnaeus).—Red-breasted Sunfish.

A very abundant and valued pan-fish, as well as interesting to the angler, in upland streams east of the Alleghenies. Length eight inches.

*Delaware River Basin* (Brandywine tributaries, streams below Chadd's Ford Junction, Linden Grove, Chadd's Ford, Darby Creek, Ridley Creek, Hunter's Run, Taylor's Run, Mill Run, Naylor's Run, Cobb's Creek, Philadelphia, Valley Forge, Montgomery County, Mill Creek, Gladwyne, Hatboro, Walnut Hill, Tacony Creek, Holmesburg, Bustleton, Byberry, Torresdale, Cornwells, Croydon, Hulmeville, Langhorne, Bridgetown, Etterton, Long Pond, Wycombe, Neshaminy Falls, Newtown, Bristol, Tullytown, Scott's Creek, Morrisville, Dingman's Ferry).

*Susquehanna River Basin* (Lancaster County, Bainbridge, Cone-

stoga Creek, Paradise, Cambria County, York Furnace, Bald Eagle Creek, Spring Creek).

*Lepomis megalotis* (Rafinesque).—Long-eared Sunfish.

An extremely variable species, reaching eight inches in length. Found west of the Alleghenies.

*Ohio River Basin* (Kiskiminitas River).

*Lepomis macrochirus* (Rafinesque).—Large-finned Sunfish.

A small species, about five inches long, found in the Ohio Valley.

*Ohio River Basin* (Kiskiminitas River).

*Lepomis incisor* (Valenciennes).—Blue Sunfish, Bream.

A variable species in quiet water. Reach a foot in length.

*Delaware River Basin*.

*Susquehanna River Basin*.

*Ohio River Basin* (Kiskiminitas River, Warren County).

*Eupomotis gibbosus* (Linnaeus).—Common Sunfish.

The most abundant species, and found in all our waters. Reaches eight inches.

*Delaware River Basin* (Brandywine tributaries, Kennet Square, Chadd's Ford, Ridley Creek, Cheney, Tinicum, Long Neck, Darby Creek, Cobb's Creek, Tacony Creek, Jenkintown, Hatboro, Valley Forge, Philadelphia, Walnut Hill, Holmesburg, Bustleton, Torresdale, Cornwells, Croydon, Hulmeville, Neshaminy Falls, Langhorne, Bridgeton, Long Pond, Edderton, Newtown, Bristol, Tullytown, Scott's Creek, Guinea Creek, Morrisville, Dingman's Ferry).

*Susquehanna River Basin* (Lancaster County, Conestoga Creek, Safe Harbor, Wimer's Mills, Swamp Bridge, Ephrata, Akron Run, York Furnace, Cambria County, Altoona, Lopez, Octoraro Creek).

*Ohio River Basin* (Port Allegany).

*Lake Erie Basin* (Erie).

*Micropterus dolomieu* (Laépède).—Small-mouthed Bass.

Perhaps our most valued game-fish in many sections, and also valued as food. Reaches a length of about eighteen inches. In our region west of the Alleghenies, though largely introduced eastward.

*Delaware River Basin* (In the Brandywine Creek, Neshaminy Creek, Bristol, Mill Creek, Bridgetown, Perkiomen Creek, Wissahickon Creek, Royersford, Lafayette, Shawmont, Flat Rock, Bristol, Little Washington, Trimble, Byram, Milford, Rigelsville, Easton, Manunka Chunk, Delaware, Delaware Water Gap, Portland, Lackawaxen, Pond's Eddy, Handsome Hedd, Schuylkill River).

*Susquehanna River Basin* (At Harrisburg, Columbia Dam, Safe Harbor, McCall's Ferry, Fite's Eddy, Peach Bottom, Juniata River, Centre County, Newton Hamilton, Martinsville, Carpenterville).

*Ohio River Basin* (Youghiogheny River, Port Allegany, Corydon, Cherry Run, Kiskiminitas River).

*Lake Erie Basin* (Erie).

*Micropterus salmoides* (Laépède).—Large-mouthed Bass.

A large and valued food-fish, though generally less esteemed than the preceding by anglers. Length eighteen inches. Not found east of the Alleghenies, except as introduced.

*Delaware River Basin* (at Bristol).

*Susquehanna River Basin* (in Centre County).

*Ohio River Basin* (Warren County).

*Lake Erie Basin* (Erie).

Family PERCIDÆ (Perch).

*Stizostedion vitreum* (Mitchill).—Pike Perch, Susquehanna Salmon.

A large valued food and game-fish, found west of the Alleghenies, though introduced eastward. Reaches three feet.

*Delaware River Basin* (in Schuylkill River, Lehigh River).

*Susquehanna River Basin* (in Lancaster County, Fite's Eddy, Mud Island, Millersburg, Washington, Columbia Dam, Duncannon, Harrisburg, Steelton, Dauphin, Juniata River, Sunbury, Cambria County).

*Ohio River Basin* (Monongahela City, Pittsburgh, Allegheny River, Youghiogheny River, Beaver River, Meadville, Warren County, Port Allegany).

*Lake Erie Basin* (Erie).

*Stizostedion canadense* (Griffiths).—Sauger.

Though a valued food fish, smaller than the last. Not found east of the Alleghenies.

*Ohio River Basin* (Youghiogheny River, Beaver River, Warren County).

*Lake Erie Basin* (Erie).

*Perca flavescens* (Mitchill).—Yellow Perch.

An abundant and good food-fish, in most all our waters. Length a foot.

*Delaware River Basin* (Scott's Creek, Darby Creek, Holmesburg, Torresdale, Croydon, Hulmeville, Neshaminy Falls, Newtown, Bristol, Tullytown, Morrisville).

*Susquehanna River Basin* (Lancaster County, Conestoga Creek, York Furnace).

*Lake Erie Basin* (Erie).

*Percina caprodes* (Rafinesque).—Log Perch.

Found in all our streams, except the Delaware, though rare east of the Alleghenies. The largest of the darters, reaching eight inches in length.

*Susquehanna River Basin*.

*Ohio River Basin* (Lock No 9, Monongahela River, Youghiogheny River, Allegheny River, Kiskiminitas River, Meadville).

*Lake Erie Basin*.

*Hadropterus phoxocephalus* (Nelson).—Slender-headed Darter. Lives in sandy streams west of the Alleghenies. Length six inches.

*Ohio River Basin* (Lock No. 9 Monongahela River).

*Hadropterus macrocephalus* (Cope).—Long-headed Darter.

Found in clear rivers west of the Alleghenies, not in brooks. Length three inches.

*Ohio River Basin* (Youghiogheny River, Foxburg, Cherry Run, Marsh Run, Two Lick Creek, Mud Lick Creek).

*Hadropterus pelatus* (Cope).—Shielded Darter.

Streams east of the Alleghenies. Length four inches.

*Susquehanna River Basin* (Conestoga Creek).

*Diplosomus bleekerioides* (Rafinesque).—Green-sided Darter.

A handsome species, found in clear brooks west of the Alleghenies.

*Ohio River Basin* (Monongahela River, Kiskiminitas River, Beaver River).

*Boleosoma nigrum* (Rafinesque).—Johnny Darter.

Abundant west of the Alleghenies. Length usually less than three inches.

*Ohio River Basin* (Monongahela River, Kiskiminitas River, Foxburg, Port Allegany, Cole Grove, Two Lick Creek, North Branch of Two Lick Creek, Big Mahoning Creek, Crooked Creek, Pine Creek, Cherry Run, Marsh Run, McKenny Run, Simpson's Run, Allen's Run, Home Run, Besnaham Run, Rock Run, Elders Run, Little Run, Smitten Run, Mud Lick Run, Groft's Run, Hileman's Run, Martin's Run, Pickering Run, McCormick's Run, Ross Run, Grant Township, Pine Township, Marion Branch).

*Boleosoma nigrum olmstedi* (Storer).—Tessellated Darter.

A very abundant species east of the Alleghenies. Attains three inches or more in length. Common on sandy bottoms. Variable.

*Delaware River Basin* (Kennett Square, Mendenhall, near and below Chadd's Ford Junction, Chadd's Ford, Ridley Creek, Reese's Run, White Horse, Hunter's Run, Taylor's Run, Mill Run, Cheney, Darby Creek, Cobb's Creek, Tinicum, Naylor's Run, Valley Forge, Gladwyne, League Island, Tacony Creek, Jenkintown, Frankford Creek, Holmesburg, Bustleton, Hatherly, Walnut Hill, Torresdale, Cornwells, Byberry, Croydon, Newportville, Flushing, Brookfield Run, Hulmeville, Neshaminy Falls, Little Neshaminy Creek, Edderton, Long Pond, Laghorne, Wycombe, Newtown, Bristol, Guinea Creek, Tullytown, Morrisville, Easton, Belfast, Dingman's Ferry).

*Susquehanna River Basin* (Lancaster County, Octoraro Creek, Nottingham, Paradise, Bainbridge, Ephrata, Denver, Trout Run, Snoketown Run, Sugar Valley Run, Wopsonomick Valley Run, Altoona, York Furnace, Centre County, Cambria County, Emporium, Lopez).

*Ammocrypta pellucida* (Baird).—Sand Darter.

An interesting species, living in clear sandy streams west of the Alleghenies. They often lie mostly buried in the sands of the bottom. Length three inches.

*Ohio River Basin* (Youghiogheny River, Monongahela River).*Etheostoma variatum* (Kirtland).—Variegated Darter.

A handsome fish found west of the Alleghenies. Length a little over three inches.

*Ohio River Basin* (below Lock No. 9 Monongahela River, French Creek, above Franklin, Foxburg).

*Etheostoma zonale* (Cope).—Banded Darter.

Found in small clear streams west of the Alleghenies. Length three inches.

*Ohio River Basin* (Monongahela River).*Etheostoma maculatum* (Kirtland).—Spotted Darter.

A beautiful species, less than three inches long, living in clear swift streams west of the Alleghenies.

*Ohio River Basin* (Shenango River at Jamestown in Mercer County).

*Etheostoma caeruleum* (Storer).—Blue Darter, Rainbow Darter.

A gorgeous little fish, in streams west of the Alleghenies. Length less than three inches.

*Ohio River Basin* (Monongahela River, Kiskiminitas River).*Etheostoma flabellare* (Rafinesque).—Fan-tailed Darter.

Found west of the Alleghenies. An active species, living in swift water, and less than three inches long.

*Ohio River Basin* (Monongahela River, Pittsburgh, Youghiogheny River, Port Allegany, Kiskiminitas River, Two Lick Creek, North Branch of Two Lick Creek, Marsh Run, McKenny Run, Cherry Run, Simpson's Run, Ross Run, Groft's Run, Smitten Run, Hileman Run, Crooked Run, Pine Township).

*Boleichthys fusiformis* (Girard).—Spagnum Darter.

A lowland species found east of the Alleghenies. Length less than three inches.

*Delaware River Basin* (Bristol).

## Family SERRANIDÆ (Sea Bass).

*Roccus lineatus* (Bloch).—Striped Bass.

One of the best of our food and game-fishes. It sometimes reaches a very large size, specimens weighing one hundred and twenty-five pounds having been recorded, though these not taken in Pennsylvania. Average weights are probably between three and six pounds. Found ascending our rivers east of the Alleghenies.

*Delaware River Basin* (Tinicum, League Island, Tacony, Holmesburg, Torresdale, Cornwells, Bristol, Tullytown, Morrisville).

*Susquehanna River Basin* (York Furnace and Comestoga Creek).*Roccus chrysops* (Rafinesque).—White Bass.

A fresh-water species, found in still and deep waters, west of the Alleghenies. Length fifteen inches. Valued as food.

*Genesee River Basin* (below Gold).*Lake Erie Basin* (Erie).*Morone americana* (Gmelin).—White Perch.

An abundant and fine pan-fish in streams east of the Alleghenies. Reaches fourteen inches in length.

*Delaware River Basin* (Brandywine Creek, League Island, Philadelphia, Fairmount Dam, Schuylkill River, Tacony, Holmesburg, Torresdale, Cornwells, Neshaminy Creek, Croydon, Tullytown, Morrisville).

*Susquehanna River Basin* (York Furnace).

## Family SCIAENIDÆ (Croakers).

*Aplodinotus grunniens* (Rafinesque).—Fresh-water Drum, Sheep-head, Jewel Head.

A large fish not much valued as food, though sometimes reaching fifty pounds in weight. Found in the larger bodies of water west of the Alleghenies.

*Ohio River Basin* (Ohio River to Pittsburgh, Monongahela River, Allegheny River).

*Lake Erie Basin* (Erie).

## Family COTTIDÆ (Sculpins).

*Cottus ictalops* (Rafinesque).—Miller's Thumb, Blob, Bull-head, Muffle-jaw.

Clear rocky streams west of the Alleghenies. Variable and very destructive to trout eggs. Reaches seven inches in length.

*Ohio River Basin* (Lock No. 9 Monongahela River, Youghiogheny River, Pittsburgh, Ohio Pyle, Susquehanna Creek, Cherry Run, McKenny Run, Smitten Run, Allen's Run, Simpson's Run, Foxburg, Meadville).

*Cottus gracilis* (Heckel).—Slippery Miller's Thumb, Stargazer.

A variable species, found abundantly in most of our cold rocky upland brooks and small streams. Very destructive to trout eggs. Length four inches.

*Delaware River Basin* (Brandywine Creek, West Chester, Port Kennedy, Douglassville, Reading, New Britain, Easton).

*Susquehanna River Basin* (Spruce Creek, Cambria County, Lancaster County, Ephrata, Thompson's Spring, Big Spring, Williamsburg, Carlisle, Mountain Creek, Yellow Breeches Creek).

*Ohio River Basin* (Allegheny River, Cherry Run, Two Lick Creek, Port Allegany).

*Genesee River Basin* (Gold, Potter County).

## Family SOLEIDÆ (Soles).

*Achirus fasciatus* (Lacépède).—Sole.

A small species, popularly known as "flounder" in our tidal reaches of the Atlantic Slope. Length six inches, and not valued as food.

*Delaware River Basin* (Schuylkill River, Bristol).

## Family GADIDÆ (Cods).

*Lota maculosa* (Le Sueur).—Ling, Burbot.

Found mostly west of the Alleghenies. Reaches two feet in length, and not much valued as food.

*Susquehanna River Basin* (Muncy).

*Lake Erie Basin* (Erie).

## OPINIONS OF ATTORNEY GENERAL.

The following are the opinions of the Attorney General's Department in regard to interpretations of the law on the various subjects presented:

## NEW HATCHING HOUSE AT ERIE.

Early in the year it was discovered that owing to the steps taken in regard to the water supply of Erie, due to rulings of the Board of Health after a severe epidemic had prevailed in the city, the water as furnished for the use of citizens could no longer be used for hatching of fish. It was, therefore, necessary to remove the eggs in the batteries to the station at Union City, where water could be had in its raw, or untreated state.

The Legislature of 1911 appropriated seven thousand dollars for the erection of a new hatching house at Erie, to replace the present structure. In a previous opinion the Attorney General's Department had advised this Department that the money could not be used to build a hatchery on any site except the one now owned by the Commonwealth. In answer to the query whether, in view of the state of the water supply, it would be possible to erect a hatchery on a new site where other and untreated water could be obtained the Attorney General advised the Department, in the following opinion, that it would not be possible to do so:

Harrisburg, January 30, 1912.

Hon. N. R. Butler, Commissioner of Fisheries, Harrisburg, Pa.

Dear Sir: This Department is in receipt of your letter of January 4, 1912, stating that on account of the method necessarily used by the City of Erie in the purification of its water supply, it has become impossible to operate the fish hatchery located at Second and Sassafras Streets in the City of Erie, and inquiring whether the appropriation of \$7,000 made by the Legislature at the session of 1911, "for the building of a new and permanent hatching house at the Erie Hatchery, Erie, to replace the present structure," can be used to erect a hatchery at a different site upon ground leased to the Commonwealth by the Commissioners of Water Works of the City of Erie.

Upon reference to the files of this Department, I find that on September 19, 1911, Assistant Deputy Attorney General Hargest, advised you that this appropriation "is limited to the building of a new and permanent hatching house at the present Erie Hatchery, and cannot be used for building a new hatching house at another location."

There is nothing in the statement of facts contained in your letter of January 4, 1912, that would justify a modification of the opinion heretofore rendered by this Department.

Of course, you are not required to expend this appropriation in the erection of a hatching house at the present site of the Erie Hatchery, if the water supply obtainable there is unsuitable for the purposes of a fish hatchery, but it will be necessary to have additional legislative action before a hatching building can be erected on a different site.

Very truly yours,  
(Signed) J. E. B. CUNNINGHAM,  
Deputy Attorney General.

JEBC—R

## PRESQUE ISLAND HATCHERY.

By the appropriation act of 1911 twenty thousand dollars was appropriated for a fish hatchery at Presque Island Peninsula, Erie County. The question before the Department was as to just how this money could be used, and upon submission to the Attorney General the following opinion was rendered:

Harrisburg, February 27, 1912.

Hon. N. R. Buller, Commissioner of Fisheries, Harrisburg, Pa.

Dear Sir: This Department is in receipt of your communication under date of February 8th, 1912, asking to be advised whether the appropriation to the Department of Fisheries, contained in the General Appropriation Bill of June 14, 1911, at page 234, and reading as follows:

"For the making of plans, the purchase of machinery, boats and for other expenses incidental towards the construction of the State fish hatchery on Presque Isle Peninsula, Erie County, authorized by an Act of the Legislature, session of one thousand nine hundred and nine, and approved by an Act of Congress, session of one thousand nine hundred and ten, two years, the sum of twenty thousand dollars (\$20,000)." can be so construed as to allow the use of the twenty thousand dollars for the cleaning out of certain ponds and opening up the natural channels connecting said ponds with the bay.

The reply to your inquiry necessarily involves a brief review of the circumstances leading up to the making of this appropriation.

Presque Isle Peninsula is a peninsula extending out into Lake Erie, beginning at a point some distance west of the city of Erie and extending in a northeasterly direction, curving around toward the shore of the lake at a point some distance east of the said city of Erie and forming a harbor for that city, known as Presque Isle Bay.

In the Act of February 4, 1869, (P. L. 105,) it is recited in the preamble that the councils of the city of Erie have so neglected the management and supervision of this peninsula as to prevent any adequate revenue arising therefrom, and it is accordingly provided that Section 14 of the Act of April 2, 1868, incorporating the City of

Erie, be so far amended as to place the supervision and control of this peninsula in the power of the Board of Directors of the Marine Hospital of Pennsylvania, which hospital was incorporated by the act of March 22, 1867, (P. L. 538). By subsequent legislation, to wit, the act of May 11, 1871, (P. L. 371), it was enacted that the said corporation, incorporated under the name of the Marine Hospital of Pennsylvania, should "convey to the United States of America, all title it may have to the peninsula of Presque Isle obtained from the State of Pennsylvania by Act of February 4th, Anno Domini one thousand eight hundred and sixty-nine, \* \* \* \* to be held by the United States as fully as may be in its present condition and only for the purposes of national defense and for the protection of the harbor of Erie, but in all other respects to be subject to the civil and criminal jurisdiction of the State of Pennsylvania."

In and by said act of Assembly, the consent of the State of Pennsylvania was given to such transfer of title for the purposes and under the limitations above mentioned.

The act of April 22, 1909, (P. L. 118), entitled:

"An act providing for the Department of Fisheries of the Commonwealth of Pennsylvania, entering upon and occupying, with the approval of the United States, certain lands on the peninsula known as Presque Isle, in Erie County, Pennsylvania, and improving the same and the ponds thereon, and establishing a hatchery thereon for the propagation of game and food fishes; to erect buildings and structures thereon suitable for that purpose, and to make walks and roads on said lands for ingress to and over said premises, and for the proper care and maintenance of the same," contains a preamble which reads as follows:

"Whereas, There are on the peninsula belonging to the Commonwealth of Pennsylvania, and known as Presque Isle, in the County of Erie, Pennsylvania, a large number of ponds suitable for the hatching and propagation of game and food fishes,—such as bass, pike and muscalonge, some of which can not be readily hatched by artificial means,—and which ponds were the natural habitat and hatching grounds of said fishes prior to the closure of the connections between said ponds and the waters of the Bay of Presque Isle; and,

Whereas, By improving said peninsula and cleaning and improving said ponds and stocking them with breeding fish, the Department of Fisheries can utilize these natural breeding grounds to very largely increase the production of game and food fishes."

It is then provided in and by the said act of 1909:

"That the Department of Fisheries of the Commonwealth of Pennsylvania is hereby empowered and directed to enter upon and occupy all that part of the peninsula known as Presque Isle, in the County of Erie, Pennsylvania, (here follows a description of a portion of the peninsula), and *improve the said lands and ponds thereon*; and *establish thereon a fish hatchery for the propagation of game and food fishes; erect suitable buildings and structures on said lands therefor; and make suitable walks, roads, docks and ap-*

proaches thereto and thereon as may be deemed necessary to *establish said hatchery*; and care for the ponds and the lands hereby appropriated, and other facilities established and maintained on said peninsula for the propagation of game and food fishes; Provided however, That all of the rights hereby conferred upon the Department of Fisheries of the Commonwealth of Pennsylvania shall be and are subject to the grant heretofore made to the United States by the Commonwealth of Pennsylvania."

Even a cursory examination of this statute discloses that the preamble and the enacting clause thereof are not in harmony. The mischief referred to in the preamble is that certain ponds located on Presque Isle Peninsula, which were formerly the natural habitat and hatching grounds of certain game and food fishes, have been rendered useless as natural hatching grounds, because the connecting channels between the ponds and the bay have become filled up with sand and debris.

It is further stated in the preamble that some of the game and food fishes referred to therein cannot be readily hatched by artificial means.

It is clear from a reading of the preamble that the appropriate remedy for the mischief therein recited is the cleaning out of the ponds and the opening up of the closed channels. The enacting clause, however, goes much further than this. It not only authorizes the Department of Fisheries to enter upon and occupy, but subject to the rights of the Federal Government, a large portion of the peninsula and to improve and care for the lands and ponds thereon, but it also authorizes the Department of Fisheries to

"establish thereon a fish hatchery for the propagation of game and food fishes; erect suitable buildings and structures on said lands therefor; and make suitable walks, roads, docks and approaches thereto and thereon as may be deemed necessary to establish said hatchery."

The enacting clause is, therefore, much broader than the preamble. The preamble contemplates only the restoration of the former *natural* hatching grounds, but the enacting clause, in addition to providing for this purpose, and although the preamble recites that some of the fish referred to in the act cannot be readily hatched by artificial means, specifically provides for the erection of an *artificial* hatchery.

Your right to expend the appropriation in question, in the manner indicated by your inquiry, depends upon the intent of the legislature in making the appropriation, but as that appropriation specifically relates to the hatchery authorized by the said act of 1909, reference must necessarily be had to the legislative intent disclosed in that act.

"The preamble of a statute has been said to be a good means to find out its meaning and, as it were, a key to the understanding of it, and as it usually states, or professes to state, the general object and intention of the legislature in passing the enactment, it may legitimately be consulted for the purpose of solving any ambiguity

or of fixing the meaning of the words which may have more than one, or of keeping the effect of the act within its real scope whenever the enacting part is in any of these respects open to doubt." —*Endlich on Interpretation of Statutes*, 62.

"The same decisions, however, which establish the doctrine above stated, as to the admissibility of the preamble in the construction of a doubtful provision in a statute, also declares that, when the meaning of the enacting part is clear and free from ambiguity it cannot be controlled, with either enlarging or restraining effect, by the preamble." *Item, 4.*

"While the preamble may explain the motives of the legislature in the enactment, it does not always do so, and it is not to be given greater consideration than other parts of the act. Where the enacting clause is in words free, *per se*, from doubt and the preamble is not referred to therein, an apparent restriction in the preamble will not be given effect in the enactment." —*Pepper & Lewis' Digest of Dec., Vol. 20, p. 34954.*

Under these general principles relating to the construction of statutes it may be safely concluded that the enacting clause of the said act of 1909, which is free from ambiguity, is not restrained or restricted by its preamble, and that the legislature in any by said act has authorized the Department of Fisheries to enter upon the peninsula in question, and, in addition to improving and caring for the ponds thereon, erect an artificial hatchery for the propagation of game and food fishes.

In the year 1910 Congress passed a bill providing, *inter alia*,

"That the Department of Fisheries of the State of Pennsylvania, is hereby granted the right to enter upon and occupy the following described land of the United States, known as Presque Isle Peninsula, in the County of Erie, State of Pennsylvania, (here follows a description of the land in question), for the purpose of *establishing and maintaining a hatchery* for the propagation of game and food fishes, and in pursuance thereof to improve the lands and ponds and reclaim marsh lands thereon; to construct buildings, houses, sheds, etc."

It is provided in this act of Congress that the occupation and use of the lands shall in no manner affect the right, title and interest of the United States in and to said lands, nor the Government's right of passage over and across the lands so occupied. It is further provided that the United States shall not be liable for any damages that may at any time occur to the improvements of the Department of Fisheries, and that the exercise of the rights granted and the execution of any work on said lands shall be in accordance with such plans and specifications as may be approved by the Secretary of War, and subject to such further stipulations and conditions as he may prescribe.

It is interesting, but not important, in the disposition of your inquiry, to note that this act of Congress refers to the land in question as land of the United States, whilst the said act of 1909 refers to it as "belonging to the Commonwealth of Pennsylvania."

We are now prepared to consider the exact language of the appropriation in question. It is an appropriation of twenty thousand dollars (\$20,000) to your Department, which you are authorized to expend "for the *making of plans*, the purchase of machinery, boats, and for other expense incidental towards the *construction* of the *State fish hatchery* on Presque Isle Peninsula, Erie County, authorized by an act of the legislature, etc."

The act of 1909 carried no appropriation and the legislature of 1911, made this appropriation for the payment of expenses incidental towards the construction of the particular hatchery authorized by the previous legislature of 1909. It is not an appropriation for a new project but for "the *construction of the State Fish Hatchery*" heretofore authorized. Whilst the purchase of machinery and boats might be incidental to the cleaning out of the ponds which formerly afforded natural hatching grounds, it could hardly be contended that the phrase "making of plans" could be construed as referring to anything other than the construction of an artificial hatchery.

Two projects were authorized by the legislature of 1909; the one, the restoration of the ponds and channels to their former condition as natural breeding grounds, the other, the construction of an artificial hatchery. The legislature of 1911 had it within its power to make appropriations to either or both of these projects, but, in the opinion of this Department, the appropriation now under consideration was intended by the legislature to be expended in the preliminary work incidental to the construction of an artificial hatchery, and not for the purpose of cleaning, reclaiming and restoring ponds and channels as natural breeding grounds.

You are therefore advised that this appropriation cannot be construed as authorizing you to use the said sum of twenty thousand dollars (\$20,000) for the cleaning out of the ponds in question and opening up the natural channels connecting these ponds with the bay.

Very truly yours,  
(Signed) J. E. B. CUNNINGHAM,  
Deputy Attorney General.

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#### REMOVAL OF INJURIOUS FISH FROM PRESQUE ISLE BAY.

The act of the legislature regulating fishing in Lake Erie, provides that the Department can remove fish injurious to other fish. As to the best method of doing this, the Attorney General's Department was consulted, and rendered an opinion that licenses could be issued to fishermen under the provisions of the law. The following is the opinion:

Harrisburg, May 1st, 1912.

Hon. N. R. Buller, Commissioner of Fisheries, Harrisburg.

Sir: This Department is in receipt of your communication asking to be advised, in substance, whether, under the provisions of the

act of April 4, 1907, (P. L. 50), you would be justified in issuing licenses authorizing the catching of carp in Presque Isle Bay. The act is entitled:

"An act to classify the species of fish in such parts of boundary lakes, of more than five thousand acres, as this Commonwealth has jurisdiction over, and in the waters of any peninsula, or in any bay adjacent to or connected with such lakes; to declare which fish are game fish, which fish are food fish, and which are minnows or bait fish; to protect and provide for the maintenance and increase of fish in such lakes; to regulate and provide for the payment of license fees for the catching of fish from such boundary lakes, and prohibit unauthorized taking of fish from devices used by authority of such license; to provide penalties and punishments for the violation of any of the provisions of this act; and requiring the county wherein an offense is charged to pay costs of prosecution in certain instances; and repealing all acts inconsistent herewith."

This act relates to the catching of fish in such part or parts of lakes of more than five thousand acres as this Commonwealth has jurisdiction over, and in the waters of any peninsula or in any bay adjacent to or connected with such lake.

Presque Isle Bay is connected with Lake Erie, and the act is applicable to the waters referred to in your communication. The general plan of the act is to specify game fish by name, and to divide all other species of fish into food fish, and minnows and killifish. The catching of fish in the waters referred to in the act, by means of nets, or any devices other than a rod and line having not more than three hooks, or with a hand line having not more than three hooks attached, or with a trolling line with spoon hooks attached, or with a set line with hooks attached, or with a spear used for catching carp and suckers only, without a license obtained from the Department of Fisheries, is prohibited. In so far as the general provisions of the act are concerned, licenses may be issued, authorizing the taking of fish by means of nets, under certain regulations, among which regulations is found one to the effect that no net of any description shall be set or fastened within two miles of the entrance to any bay described in the act, nor shall any gill-net be set within three-quarters of a mile of any other portion of the shore of the part of any lake over which this Commonwealth has jurisdiction, nor shall any net or nets other than gill-nets and nets fastened to and supported by poles driven in the ground, be set, fastened, drawn or used within seventeen miles of such entrance to any bay described in the act.

The 3rd section of the act, however, contains a proviso reading as follows:

"Provided, That nothing in this section shall be so construed as to prohibit the use of minnow nets for angling or scientific purposes, or to prohibit the Department of Fisheries from catching fish at any time of the year with nets for the purpose of stocking other waters, or from removing by means of nets by contract or otherwise any fish which it may deem injurious to other game or food fish."

Notwithstanding, therefore, the general prohibition against the use of nets, even under license, within certain distances of the en-

trance of Presque Isle Bay, and the shores of Lake Erie, an exception is made in favor of the Department of Fisheries, and the Department is authorized, among other things, to remove, out of any water by means of nets, and fish which it may deem injurious to other game or food fishes.

You state in your communication that the Department of Fisheries has determined that the carp in Presque Isle Bay have become so numerous that they are injurious to other game and food fishes. Your Department, therefore, in my opinion, is authorized to remove these carp by "means of nets, by contract, or otherwise."

You ask to be advised whether you can legally issue licenses to fishermen for the taking of carp in Presque Isle Bay by means of gill-nets. In my opinion, the proviso of the 3rd section, above quoted, is broad enough to justify the issuing of licenses by the Department of Fisheries, to fishermen, to take carp alone, by means of gill-nets, from the waters of Presque Isle Bay.

Very truly yours,  
(Signed) J. E. B. CUNNINGHAM,  
Deputy Attorney General.

#### WARDENS' COSTS.

A question was raised by special counsel for the Commonwealth as to the right of fish wardens to collect costs in cases of conviction for violations of the fish laws. In answer to the inquiry of the Department, Attorney General Bell advised that costs cannot be so collected. The following is the opinion.

Harrisburg, February 22, 1912.

Hon. N. R. Buller, Commissioner of Fisheries, Harrisburg, Pa.

Sir: Your favor of recent date, addressed to the Attorney General, was duly received.

You asked to be advised whether the fees of fish wardens can be charged in as part of the costs in cases in which there have been convictions for violations of the fish laws. Section 29 of the Act of May 1, 1909 (P. L. 353), provides:

"The wardens shall enforce all the laws of the Commonwealth, relating to fish and fishing, and the provisions supplementary thereto; and shall have power to execute all warrants and search warrants issued for the violation of the fish laws, and to serve subpoenas issued for the examination, investigation, or trial of all offenses against said laws; and said wardens shall be permitted to carry and use arms in the performance of their duties. They shall have power without warrants to search and examine any boat, conveyance, vehicle, fish box, basket, bag, coat, or other receptacle for fish, when they have reason to believe that any of the provisions of any law relating to fish have been violated; and said wardens shall seize and take possession of any and all fish which may have been

caught, taken or killed at any time, in any manner or for any purpose, or had in possession or under control, or have been shipped or about to be shipped, contrary to any of the laws of this Commonwealth; \*\*\* and all wardens when in the performance of their duties shall have the power and authority to enter upon any land or water, and they shall have the power to demand and secure proper assistance in case of emergency. That each fish warden, except the chief warden, appointed in accordance with this section, shall receive as compensation for his services seventy-five dollars per month, and such allowance for expenses as may be deemed by the Board of Fishery Commission as just and reasonable."

Section 30 provides, in part:

"The Commissioner of Fisheries may on the written application of a properly organized fish protective association, or of any association or individual owning or leasing waters, appoint one or more *special fish wardens* for the county in which the application is made; and all such appointments shall expire on the thirty-first day of May of each year; Provided also, That no special fish warden shall be entitled to any salary, or to any expenses or compensation from the Commonwealth, for his services, unless such special fish warden should be detailed for duty by the Commissioner of Fisheries, in which case the Commissioner of Fisheries is authorized to make a per diem allowance for compensation, and reasonable expenses, out of any appropriations which may be made for the payment of wardens. The said allowance being in place of any claim for any part or share of any fine or fines, penalty or penalties, imposed or paid under the provisions of this Act."

The 27th section of said act of Assembly provides for the trial and sentence by the justice, alderman or magistrate, "to pay the fine or fines, penalty or penalties, provided in this act for such violation, together with costs of suits."

In the case of *Walsh vs. Luzerne County*, 36 Pa. Super. Ct. 425, it is decided, as stated in the syllabus:

"The public officer who is prevented by statute, or by judicially established principles of public policy, from demanding and collecting for his own use a fee for serving a criminal warrant, cannot demand and collect it for the use of the Commonwealth."

That case arose upon the claim of a member of the State Police to the fees for serving a warrant. A State Policeman was paid a regular salary and the service of the warrant was performed in the course of his duties as imposed by the act of May 2, 1905, P. L. 361, relating to the State Police.

In an elaborate opinion by the Court below, which was adopted by the Superior Court, it is said:

"That as a salaried police officer of the State, he is not legally entitled to demand these fees for his own use."

And again,

"That certain salaried officials may collect fees and pay them into the public treasury, is of course true; but in every instance where

this is done it is because the express mandate of the law requires it, and not because of any inherent right or duty growing out of the fact that the officer is elected by the people, or appointed by the Governor or some other official through whom the sovereignty of the people is exercised, and is paid a salary out of the public purse."

The Court therefore concluded that "John F. Walsh is not entitled to receive the money in question for his own use or that of the Commonwealth."

That case rules the question which you ask, so far as it applies to the salaried fish wardens. In making the arrests and in prosecuting the cases for the violation of the fish laws, they are acting in pursuance of the duty imposed upon them by law, just as the police officer in the case referred to was acting. They are paid salaries by the Commonwealth, and therefore upon the authority of the case just referred to, or not in my opinion entitled to charge or recover their fees as costs either for their own use or the use of the Commonwealth.

But with reference to the special fish wardens, the situation is different. If the services of the special fish wardens are rendered during the time such fish wardens have been detailed for duty by the Commissioner of Fisheries, and for such services the said special fish wardens are paid a per diem allowance for compensation and reasonable expenses," as is provided by section 30 of the Act of May 1, 1909, P. L. 353, above quoted, they are not entitled to charge fees as costs.

If, however, a case is prosecuted by a special fish warden who is not paid such a "per diem allowance for compensation and reasonable expenses" by the Commonwealth, then such fish warden is entitled to charge all legal fees as costs in the case.

Very truly yours,

(Signed) JOHN C. BELL,  
Attorney General.

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## COURT DECISIONS.

During the past year the Department, fortunately, did not have much business in the Courts of Record of this State. The term "fortunately" is used because the Department has, under the present appropriation, only one thousand dollars a year to pay for court expenses, and this will not pay for many cases carried up to the highest court of the State.

In Bedford County there was an appeal from a decision of the magistrate to the Court of Quarter Sessions, but after hearing the case, Judge Woods sustained the magistrate but did not deliver any opinion. He, however, while directing the defendant to pay the costs suspended the payment of the fine.

There was one case in Bradford County, which is reported below, that is of much interest to persons using eel baskets. The law states distinctly that the holder of a license for taking eels in a fish basket shall be liable for any violation of the law. The defendant in this case claimed that he had removed the bottom of his basket the last time it was used, and it must have been replaced by some persons unknown for the purpose of fishing. It is absolutely essential, if the laws are to be carried out in the proper spirit, that the persons using devices must be held responsible that they are only used legally.

In Montgomery County the Department brought suit against a manufacturing establishment for running pollution into the Schuylkill River. The suit was won before a magistrate, but on the appeal to the Quarter Sessions this decision was reversed. While the Department was not satisfied with the finding of the court, it was deterred from taking an appeal by the lack of funds under the control of the Department.

## QUESTION OF POLLUTION.

Last year complaint was received at the Department that a manufacturing establishment at Port Kennedy was running pollution into the Schuylkill River. The complaint stated that the fluid flowing from the plant was as white as milk, and deposited a white sediment upon the bottom of the river. The superintendent of the plant was arrested and convicted before a justice of the peace, who fined him \$100.00. The defendant took an appeal to the Court of Quarter Sessions, where, after a hearing before Justices Swartz and Weand, the judgment was reversed and the defendant acquitted. The following is the opinion of the Court:

IN THE COURT OF QUARTER SESSIONS OF MONTGOMERY  
COUNTY, PENNSYLVANIA, No. 5, DECEMBER TERM, 1911.

Commonwealth }  
vs.                } Sur Appeal from Summary Conviction.  
George V. Hurdle. }

## OPINION OF THE COURT AND JUDGMENT.

The defendant was arrested, tried, convicted and sentenced to pay a fine of \$100, before a Magistrate, charged with a violation of Sec. 16 of the Act of May 1, 1909, P. L. 363.

He appealed from the judgment of the magistrate and the case was heard before the court without a jury.

The information upon which the warrant was issued charged that defendant "did unlawfully put and place, and did allow and cause lime and compounds thereof, and other deleterious, destructive or poisonous substances to be turned into and run or flow into and upon the waters of the Schuylkill River, within the said county of Montgomery and the Commonwealth of Pennsylvania, contrary to Section 16, of an Act of Assembly, approved the first day of May, A. D. 1909, P. L. 363, entitled "An act to classify the fish in the waters within the Commonwealth, and to protect fish from being destroyed or injured by destructive means."

As far as this case is concerned the purpose and intent of the act is clear "to protect fish from being destroyed or injured by destructive means," and unless the defendant's acts lead to that result, he cannot be convicted.

The penalty for a violation of the act is a fine of one hundred dollars, and "in case the defendant or defendants shall neglect to pay at once, the fine or fines so imposed, said defendant or defendants shall forthwith be sentenced to undergo imprisonment in the county jail of the county where such conviction takes place, for a period of one day for each dollar of fine so imposed and unpaid. The proceeding therefore is of a penal or criminal character and must be tried and decided under the rules, law and practice governing and applicable to criminal trials.

The Commonwealth must prove the guilt of the defendant beyond a reasonable doubt—otherwise the defendant must be acquitted.

The defendant is the superintendent of the Ehret Magnesia Manufacturing Works at Port Kennedy, Montgomery County. The Company has an invested capital of over a half million dollars and employs over two hundred men—the annual wages paid out is over one hundred thousand dollars. These facts could not be an excuse for a violation of the law, but are important as bearing upon the consequences to the company in case a verdict against them should destroy their property.

Among the substances forbidden to be cast into the river is "lime" or any deleterious, destructive or poisonous substances of any kind or character," unless it is shown to the satisfaction of the Commissioner of Fisheries, or the Court, that every reasonable and practicable means have been used to prevent the pollution of waters in question by the escape of deleterious substances."

There was no evidence that any deleterious, destructive or other poisonous substance had been turned into the river other than lime and its compound, if they were of the character forbidden. Lime is the principal constituent of limestone, marble, chalk, bones, shells, &c., obtained by calcining limestones or shells, the heat driving off carbon dioxide and leaving lime. When the law included lime among the forbidden substances, it was because of its deleterious effects, else there would have been no more reason for its exclusion than would any other material. But, if limestone in its natural state or as quick lime is poisonous, can it not be so treated as to render it harmless, and if so treated does the law apply. We know that in some forms it is used as a medicine and therefore beneficial.

It is fair to assume therefore that in using the word lime it was used in its plain or commercial sense undivested of its deleterious properties, and if these are removed so as to render it harmless there would in this case be no violation of the law.

It is claimed by the Commonwealth "that the defendant in the course of his business drained lime and the compound of lime, known as 'hydroxide,' which contains the properties of a normal mild caustic solution showing an alkaline solution into the Schuylkill River." And the Commonwealth endeavored to prove that "this company in the process of their manufacturing takes lime rock from the quarry and burns it; when the original stone, which has the name in the commercial world as 'dolomite' is subjected to this heat it is broken up, and the carbon, with a chemical formation of  $CO_2$  is burned out of this natural rock and is caught in a receiver. By this process the limerock is transferred or changed into what is called calcium oxide or quick lime; that when water is added to the lime that remains, the carbon having been extracted, it slacks and forms a new compound, which has the chemical name of calcium hydroxide." In other words that the defendants have introduced into the Schuylkill River slackened lime.

To maintain this proposition the Commonwealth called a witness, J. W. Criswell, to whom Mr. Hurley explained the process of manufacturing magnesia, as shown by the Commonwealth's offer of proof as above stated. This witness is not a chemist, but was positive that the discharged substance contained slackened lime which would kill fish. His knowledge of the chemical properties of lime was principally obtained from others and from experiments made with litmus paper which turned extremely blue. Conceding, for the sake of argument, that this witness made out a *prima facie* case for the Commonwealth, it was completely rebutted by the evidence for the defendant, if believed.

W. F. Currier, a witness for defendant, testified as follows: "That he was employed in Philadelphia by Booth, Garret & Blair for seven years and received his chemical education in Boston Tech, &c., and it was admitted that he was an expert chemist. His particular branch of work was analysis of water; on January 15, 1912, he visited defendant's works and took seven or eight samples. No. 1 from the Schuylkill River, the first 75 feet above the entrance of the waste, from the magnesia works and about 100 feet from the shore. Sample No. 2 was taken from the river opposite the entrance of the waste, and about 75 feet from the further shore, right straight

across. Sample No. 3 was taken from the river about halfway between the entrance of the waste and the bridge just below there, 50 feet from the shore and about 350 feet below the waste entrance. Sample No. 4 was taken from the river about 200 feet below the waste entrance and 50 feet from the shore. No. 5 taken from the river 150 feet below the waste entrance and 50 feet from the shore. No. 6 was the mixed waste and spring water just above the railroad culvert. No. 7 is the material from the waste run about midway between the waste and the river—it is the straight waste. He made an analysis of each of these samples.

Speaking of sample No. 7, nearest the works, he said in answer to the question "did you or did you not find any evidence, and if so, what evidence of the presence of caustic lime?" A. No caustic lime present. Q. You were examining to see if you could find any caustic lime? A. Yes, sir. I was very particular about that. In all my samples. Found none in any of my samples. Q. What is carbonate of lime in the common, every day phrase? A. Marble or chalk. Q. You say there was no caustic lime present in these samples. Why do you say that? A. It would be impossible. If there was any caustic lime at any time put into that solution, into the waste, the magnesia and bicarbonate would immediately unite with it. There would be a temporary reaction resulting in the formation of calcium carbonate and magnesia carbonate. Calcium carbonate is chalk. I tried the filtered waste. I tested for lime. I wanted to get the absolute amount of lime in the solution. To my surprise, I found there was absolutely none. If there is any, it is so small amount that I did not get it. Caustic lime is what we call lime water that we take in our stomach sometimes. Q. What effect would this material waste, as it is called, have on the water of the Schuylkill River, injurious or otherwise? A. The only effect it would have under normal conditions would be to slightly increase the hardness of the water. Q. How far would that be deleterious to fish or any other life. A. Very slightly. In my opinion not at all. Calcium carbonate is harmless.

Although the act provides that in the case of the pollution of waters by substances known to be injurious to fishes or fish food, it shall not be necessary to prove that such substances have actually caused the death of any particular fish. The Commonwealth introduced evidence to show that the waste complained of did actually have that effect.

Mr. Gehman, a fish warden, testified that he had taken samples of the drainage and hired a man to catch fish on the day he took the samples. "I took three quarts of the liquid. I put one fish at a time into the solution as taken from this drain and watched the action of the fish. Of course it killed the fish. The fish after being dropped into the solution showed great signs of distress by swimming around and trying to escape by jumping out of the top. The solution adhered to the fish. They became coated with this white stuff and you could see that their gills were choked up. They were suffocated."

Mr. Treichler was present at the experiment. The substance taken from the stream (or ditch) about 300 or 400 feet below the works—"He took that substance along home in a sealed jar, and we deposited

the fish in the jar, and it killed the fish in about 40 minutes. They had a quart fruit jar and the solid matter was probably one fourth of the jar. We held the hand over the top of the jar to keep the fish from jumping out."

The defendant also made similar experiments. Their witness took waste from the mouth of this rivulet in the Schuylkill 10 feet below and placed in it a large glass bowl, such as is used for holding gold fish. Fish were put in on the 26th of October, 1911, and the bowl, with the fish alive, was produced in court on the trial, January 18, 1912, having been all the time in the original water. The water was changed three times a week since 26 Nov. but it was in since Jan 1 to 18.

Mr. Hurley testified that at first this water was run into an abandoned quarry that was filled with water. This continued until December, 1908, then they started to run it over a natural water way toward the river and pumped out the quarry, having changed the location for getting limestone, and in so doing took out about three gallon buckets of small fish and found three big carp. These fish had all lived in the quarry in the waste substance, which was thicker than that now discharged.

So far as these respective tests throw any light upon the subject we are of the opinion that those of the defendant are much more satisfactory and convincing than that of the Commonwealth.

The plant of the defendant company is about a mile from the river and the drain or ditch carrying the waste is emptied into by a rivulet or stream from a spring between the entrance of the waste and the river. The waste had been run into the quarry for four years and the limestone used is still obtained from the same quarry. These facts are important as bearing on the question as to whether the limestone or the waste is deleterious to fish or fish food.

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The defendant respectfully requests the court to find the following facts:—

First: That the word "lime" as used in the Act of Assembly under which the prosecution is instituted in this case is lime in its popular sense, or caustic or quick lime. A. We so find.

Second: The word "lime" as used in the statute under consideration does not mean carbonate of lime or chalk. A. We so find.

Third: That caustic lime is deleterious. A. We so find.

Fourth: That caustic or quick lime is deleterious and injurious to fish life, and that carbonate of lime or chalk is not deleterious or injurious to fish life. A. We so find.

Fifth: That the waste product from the Ehret Magnesia Manufacturing Company that runs from the rivulet into the Schuylkill River contains no caustic or quick lime. A. We so find.

Sixth: That the waste running from the rivulet into the Schuylkill River from the Ehret Magnesia Works is carbonate of lime or chalk. A. We so find.

Seventh: That nothing deleterious or injurious to fish life is contained in the waste as the same runs from the rivulet into the Schuylkill River. A. We so find.

Eighth: The Commonwealth failed to show by evidence that the defendant has deposited any matter deleterious or destructive to fish life from the rivulet into the Schuylkill River. A. We so find.

#### Requests for Findings of Law.

First: The information in this case charges the defendant with allowing lime and the compounds thereof and other deleterious, destructive or poisonous substances to be turned into and run or flow into and upon the waters of the Schuylkill River within the said County of Montgomery, thereby putting on the Commonwealth the burden of showing beyond a reasonable doubt that the waste of the Magnesia Works which flowed from the rivulet to the Schuylkill River was either first, lime in its popular sense, otherwise caustic or quick lime, or second, if not such lime then that the waste was poisonous or deleterious to fish life. A. Affirmed.

Second: That this prosecution being instituted by the Commissioner of Fisheries under the provisions of the Act of Assembly approved the first day of May, A. D. 1909, P. L. 363, entitled "An act to classify the fish in the waters within the Commonwealth, and to protect fish life from being destroyed or injured by destructive means," casts the burden upon the Commonwealth of showing beyond a reasonable doubt that the waste from the magnesia factory which flows into the River Schuylkill is first either lime as heretofore defined, or, second, is a poisonous or deleterious substance injurious to fish life. A. Affirmed.

Third: That the provisions of the 16th Section of said act of May 1st, 1909, P. L. 363, wherein it is provided as follows.—

"That it shall be unlawful for any person to put or place in any waters within this Commonwealth any deleterious, destructive or poisonous substances, unless it is shown to the satisfaction of the Commissioner of Fisheries or the Court that every reasonable and practicable means have been used to prevent the pollution of waters in question by the escape of deleterious substances," vests in the Court the powers of a chancellor to determine whether or not more harm and damage would be done by sustaining such a prosecution than any benefit that would accrue therefrom. A. Affirmed, if this was a proceeding in equity, but not affirmed, as a matter of law applicable in this case.

Fourth: That under all the evidence and the law this case the defendant should be adjudged "not guilty" and the prosecution should be quashed and set aside. A. Affirmed, but the verdict should only be not guilty and county for costs.

This case is decided upon the evidence advanced at the hearing, and, after due consideration, we are of the opinion that the evidence is not sufficient to convict the defendant as charged in the complaint.

AND NOW, February 19, 1912, we find the defendant not guilty and direct the county to pay the costs.

H. K. WEAND, J.

#### DISMANTLING OF EEL BASKETS.

In November, 1911, Ernest Pickett, of Towanda, Bradford County, was arrested by a State Fish Warden for illegal fishing of his eel basket. The complaint of the warden set forth that the fish basket, which was in the north branch of the Susquehanna River, was in a fishing condition between the hours of eight o'clock A. M. and four o'clock P. M., when the act allowing the use of fish baskets distinctly states they shall not be allowed to fish. The complaint also sets forth that the bottom of the basket was nailed fast instead of being movable as required by the law. The defendant was found guilty by the justice of the peace and sentenced to a fine of \$25.00 and costs. An appeal was taken to the court of Susquehanna County, which appeal was allowed by Judge Fanning then the presiding justice. Judge Fanning was succeeded in January, 1912, by Judge Wm. Maxwell and several arguments and meetings were held before Judge Maxwell resulting in taking testimony in the case before the Judge in August, 1912. Judge Maxwell filed his opinion on September 24, 1912, dismissing the appeal and confirming the conviction of the justice.

The importance of the case depends upon the interpretation of the law as to what is meant by the removal of the bottoms. In this case the defendant admitted that he had removed the bottom only from the fifth fishing fall and had not been near the basket for over a week. When found by the warden the slats had been put in the fifth fishing fall and were nailed fast. The defendant claimed that he was not under the law responsible for the acts of a trespasser, although the act says that the licensee shall be legally responsible for the illegal use of the basket.

The following is the opinion of the court:

Commonwealth } In the Court of Quarter Sessions of Bradford  
vs. } County, Penna.  
Ernest Pickett. } No. 393, Sessions, 1911.

On November 11, 1911, complaint was made by W. E. Shoemaker, State Fish Warden, before J. H. Oreutt, justice of the peace, in and for the borough of Towanda, County of Bradford and State of Pennsylvania, charging the said Ernest Pickett with a violation of the Eighth Section of the Act of May 1, 1909, Pamphlet Laws 357, relating to illegal fishing. The material portion of said complaint against said defendant is as follows: "Ernest Pickett of the County of Bradford aforesaid, on the 8th day of November, 1911, in the county and State aforesaid, then and there being, did, with force and arms, etc., unlawfully, willfully and maliciously fish with a fish basket in the waters of the north branch of the Susquehanna

River, in said county, being of the public waters of this Commonwealth, with a fish basket unlawfully constructed, in an unlawful condition, and in the daytime, between the hours of eight o'clock A. M. and four o'clock P. M., the same being with a device and at the same time not allowed or permitted by law, and being contrary to law, the entire bottom of the basket which was made of wooden slats, and which contained more than seven slats, being entirely nailed and immovable, all in fishing condition in the daytime on said date, and did with such unlawful device actually catch and take eels and other food and game fish, all contrary, etc."

On December 11, 1911, after hearing before the said justice, the said defendant was adjudged guilty of the charge contained in said complaint, and was sentenced by the said justice, to pay a fine of \$25.00 and costs, and stand committed, until the said sentence was complied with. The formal part of said sentence entered by the said justice upon his docket reads as follows:—

"And now, December 11, 1911, this case having been continued to this date for decision the Court finds the defendant, Ernest Pickett, guilty of the offense set forth in the complaint, that on November 8, 1911, being the holder of eel basket license "No. 11" in Bradford County in the North Branch of the Susquehanna River of the public waters of this Commonwealth of Pennsylvania, in the County of Bradford, said State, at a time prohibited by law between the hours of eight o'clock in the forenoon and four in the afternoon, did knowingly allow the full bottom of the fishing falls of his fish basket "No. 11" to be and remain in place in fishing condition and so that it was possible for said basket to catch fish, all maliciously at the closed period, unlawfully against the statutes and especially Section 8, of the Act of May 1, 1909, 353, and the peace and dignity of this Commonwealth and the case having been regularly proceeded with under said Act and especially Sections 24, 26 and 27 thereof, the said Ernest Pickett being present, called and interrogated in the usual way, is accordingly convicted and sentenced to forfeit and pay a fine of twenty-five dollars and cost to the justice of the peace, said fine to be paid over to the County Treasurer of said county and by him forthwith paid over to the Commissioner of Fisheries and shall be deprived of holding another license for a period of two years."

Afterwards on December 16, 1911, the said defendant petitioned the court to permit him to appeal from the conviction and sentence of the said justice in the above case, upon which date the court made the following order:

"Rule granted to show cause why appeal should not be allowed, returnable first Monday of January. Proceedings before justice to be stayed until disposition of case. By the Court, A. C. Fanning, P. J."

The defendant sets forth in his petition the following reasons, among others, asking for said appeal:

(a) "That your petitioner was, to the best of his judgment, unjustly and illegally convicted.

(b) "That the Commonwealth alleged and offered testimony to show that the eel rack of the defendant, located in the North Branch

of the Susquehanna River, at Towanda, Pa., was, on the 8th day of November, 1911, found in fishing condition between the hours of eight A. M. and four P. M."

That the evidence offered by the defendant showed the following facts, viz. *inter alia*, that the eels had stopped running, and the defendant had quit fishing his said eel rack, on or about October 31, 1911, and had not been to said rack from that date, up until after complaint was made in this case as above stated.

That when he left his rack October 31st, he took out the bottom of the fishing fall, so that the basket was not in fishing condition, and that the same was left out and was not replaced by him.

That if the rack was found in fishing condition as claimed by the Commonwealth, it was made so by a trespasser, or third party, without the knowledge and consent of the petitioner, and contrary to his wishes.

That the fishing fall from which the defendant, your petitioner, removed the bottom, was the fishing fall from the time of its removal down to the time of the making of the complaint in this case.

That there was no proof or allegation on the part of the Commonwealth that any fish or eels had been caught."

(c) "That the following questions of law arose in said case, same having been decided adversely to your petitioner, and which your petitioner is desirous of having reviewed upon his appeal, viz:

First: Whether the owner, and licensee of a fish basket, same being operated in the open season, in a lawful stream for the capture of eels, complies with the provisions of the eighth section of the Act of Assembly, of May 1, 1909, by removing from 8 A. M. to 4 P. M., the bottom of the actual fishing fall, so that the fish basket is not in fishing condition, or whether he is compelled to remove the bottom of each of the several falls in said basket.

Second: Whether or not the owner and licensee of a fish basket is liable to conviction and penalty under said Act of May 1, 1909, P. L. 353, for violation of the fish laws, in case said owner and licensee lawfully removes the bottom of a fish basket between the hours of 8 A. M. and 4 P. M. same being used for open season, in a lawful stream, for the capture of eels, and said bottom is replaced and put in fishing condition by a trespasser or third person, without his knowledge or consent and against his wishes.

Third: Whether the owner and licensee of a fish basket in the open season, in a lawful stream, same being for the capture of eels, complies with the act of Assembly, of May 1, 1909, P. L. 303, by removing the bottom of the fishing fall so that the basket is not in fishing condition, in case he shall desire to be absent and not use the said basket during the hours that is lawful to use same, or whether the said owner and licensee in order to comply with said act is obliged to visit, inspect and guard the said basket so that third persons and trespassers may not put same in fishing condition or use the same?"

To which petition and rule, the Commonwealth by Lilley & Wilson, its attorneys, filed an answer, the substance of which is as follows:

"That the defendant, one of the licensees of a fish basket located immediately south of the Ulster bridge, in said county, constructed a fish basket under said license in the open season of 1911, the same being made with wing walls, the incline falls beginning at the bed of the river where the wing walls came the nearest together, extended down stream seven lengths each successively higher so that the down stream end of the seventh fall when constructed was 4 1-2 feet above the surface of the water immediately under the south or down stream end of that, the seventh fall and adjoining this on top and on the south was a cabin or enclosed shelter for the operator and all of these seven falls and cabin were supported on two parallel poles, the up stream ends of which rested on the bed of the river at the point where the wing walls came the nearest together, and extended to full length of basket south, down the stream but in an incline elevating from the north to the south, so as to elevate the falls as before indicated.

On November 8, 1911, W. E. Shoemaker, State Fish Warden, accompanied with Fish Warden Marcey, at about 3:20 P. M. found this fish basket intact, with all of the bottoms in place, and in perfect fishing condition, the top surface of the water being to such height that it filled all the falls to and including the sixth, and just barely flowed over the south or high end of the sixth fall into the bottom of the seventh. These facts were all absolutely undisputed before the justice.

The answer further set out, in substance, that at the trial before the said justice, the defendant claimed that on October 31, 1911, he removed the bottom of the fifth fall, which he claimed was at the time the height of the water, and at that time the actual fishing fall where the fish could be trapped and taken, and did not again visit the fishing device or basket from October 31, 1911, to the day of his arrest. There was no proof from any source that any of the falls had been removed as required by law during the closed portion of the days, except the statement of the defendant, that when he left the basket on October 31, 1911, he had removed the bottom of fall No. 5, which as he alleged was the fishing fall at the time. That there was no proof that any third person had been near the basket between those dates.

It was claimed on the part of the Commonwealth, by its answer, "that the law provides for the removal of all of the bottoms during the closed hours of the daytime, for the protection of game and other food fish, and not especially for such fish as it is lawful to catch in a fish basket at prescribed periods and makes it incumbent upon a licensee during the prohibited hours and periods, to place his basket so that it is not only improbable but absolutely impossible for it to be in a condition to catch fish, and so that this condition cannot even arise from mere natural causes such as the rising of water, and the licensee is bound to see to it that his basket is so arranged, at his peril."

To which answer the defendant filed a replication.

This application for an appeal, from the contents of the petition upon which the appeal was asked for, together with the answers, raised questions of fact, and testimony in support of the rule was taken on the part of the defendant on Friday, August 2, 1912, by

agreement of the parties interested. There was no testimony taken on behalf of the Commonwealth. Upon conclusion of the hearing, the matter was submitted to the Court.

After carefully considering this case, we think, under the proviso to the 8th section of the Act of May 1, 1909, P. L. 357, which reads as follows: "That the bottoms of said basket shall be movable for the entire width of each and every fall, or so much of said bottoms be movable as to leave not more than seven slats in one section, and such bottoms, or parts of bottoms, shall be taken out of said falls, or so adjusted, as to make it impossible for them to catch fish from eight o'clock in the morning and kept out until four o'clock in the afternoon."

It will be noted that the language of this act refers to the bottoms "of each and every fall" or so much of said bottoms be movable as to leave not more than seven slats in one section, and such bottoms or parts of bottoms shall be taken out of said falls, or so adjusted as to make it impossible for them to catch fish from eight o'clock in the morning and kept out until four o'clock in the afternoon."

We think the foregoing sentence, which we have quoted, must be read together, and not separated, in giving this act the proper construction. It describes how the bottoms of the falls be constructed, and the number of slats that may be allowed to be immovable in each bottom, and then it provides for the removable or adjustment of the bottoms during the prohibited hours, and the language used in this sentence relates to the bottom of all the falls in the basket. The dismantling of the basket, so as to make it impossible to catch fish, is the purpose and intention of the Legislature, and to remove the bottom in but one fall in which water is running, or that happens for the time, to be the "fishing fall" at the close of operations for the day, is not such a disabling of the basket as to make it impossible to catch fish, and especially is this true, when the licensee expects to remain away for several days, considering the rise and fall of the water in the larger streams of the Commonwealth.

There is no dispute as to the construction of this fish basket in question. The defendant says it consisted of seven falls, each fall being ten feet in width by four feet in length, except the seventh fall, which was ten feet by two and one-half feet in width. That the upper end of the fall one, was located on the bottom of the river bed, at the point where the wing walls came the nearest together. That each fall had a drop of eight inches, except the first fall, and this one had a drop of ten inches. That the basket was so constructed that the seventh fall was six feet above the bed of the river and four and a half feet above the surface of low water. The defendant testified and states in his petition filed, that on the night of October 31st, or morning of November 1, 1911, before leaving his fish basket, he removed the bottom of "fall five," and this was, at that time, the fishing fall, and that he did not return to his basket again prior to his arrest on November 8, 1911, and did not replace said bottom in fall five, nor authorize any other person to do so, and did not know or have any knowledge that it had been replaced prior to his arrest.

He testified and also called several witnesses, who claimed to be experienced men, in operating eel racks, or baskets who testified, in

substance that with the bottom of fall five out of his fishing basket, the basket was not in fishing condition, and would not catch fish even if the water should raise and flow into fall "six" and "seven" of said basket, as the suction of the water through open fall five, would carry the fish through this opening.

The defendant also testified, upon cross examination, that in case the water fell low enough, so as not to flow in the fifth fall, that the basket would fish, but he added, "I was watching that." He said, in order to do this, the water would have to fall about one and a half feet.

As stated in the petition of the defendant for this appeal, that the Commonwealth offered evidence before the justice, that on November 8, 1911, this fish basket was found in fishing condition between the hours of eight A. M. and four P. M., with all of the bottoms in all of the falls in this basket.

The Commonwealth filed an answer, in which was set forth as follows:

"On November 8, 1911, W. E. Shoemaker, State Fish Warden, accompanied with Fish Warden Marcey, at about 3:20 P. M. found this fishing basket intact, with all the bottoms in place, and in perfect fishing condition, the top surface of the water, being to such height that it filled all of the falls to and including the sixth, and just barely flowed over the south or high end of the sixth fall into the bottom of the seventh. These facts were all absolutely undisputed before the justice." Which facts set out by the Commonwealth in the answer filed, were not disputed by the defendant. In fact, the whole matter seems to turn to the one question, to wit: Was the defendant liable under Section 8 of the act of May 1, 1909, under his own allegations, in not removing the bottoms or parts of bottoms of all the falls in the basket, or so adjusting the bottoms in each and all of the falls, as to make it impossible for them to catch fish from eight o'clock in the morning to four o'clock in the afternoon.

We think that the language used in this act of Assembly it is plain that the Legislature intended, that during the hours of the day, from eight A. M. to four P. M., the bottoms or parts of bottoms shall be taken out of more than one fall, or so adjusted in more than one fall of the basket that when located in the open streams and rivers it will not be possible to catch fish, in case the water or stream shall rise or fall during said period. The fishing fall, on the morning of November 1, 1911, may not have been the fishing fall, during the days of November 1st to the 8th, as it depended entirely upon the condition of the stream, the rain, and the rise and fall of water during said seven days, during which the defendant did not visit his basket, or pay any attention to it, except he says, he was watching the river, to ascertain if the stream was changing. We think this is not a sufficient compliance with the provisions of the eighth section of the act of May 1, 1909, for the reason that the defendant admits, that if the water fell a foot and a half at any time during the period between November 1st and November 8th, that fall "three" and "four" of his basket would be in fishing condition, and would catch fish, and we think if the water raised, so that it was flowing over fall six and emptying into fall seven, as it was

found by the fish warden on November 8, 1911, and not disputed, that then the basket would be in condition so that it might be possible to catch fish, and we think highly probable.

In the case of the Commonwealth against Jolly, 15 Dist. R. page 308, Judge McClure in construing this act of 1909, that "the racks above the water as well as those so deeply immersed that a fall in the water, such as might occur between sunrise and sunset, would render them dangerous to fish, or hinder their migration, need not be removed, is a construction which no doubt would be within the reason and spirit of the statute."

This case of the Commonwealth against Jolly was cited with approval by the Court of Quarter Sessions of York County, in the case of the Commonwealth against J. Calvin Smith.

We agree with the decisions of the Courts above referred to. We think, that this question must, however, depend upon the peculiar facts in each case as to whether the bottoms of some of the falls are so deeply immersed in the water as to make it impracticable and unnecessary to remove the same, or are so far removed above the surface of the water that it would be unnecessary to remove the same, in order to adjust the bottom, to make it impossible to catch fish.

While the act says that, "such bottoms or parts of bottoms shall be taken out of said falls, or so adjusted as to make it *impossible* for them to catch fish from eight o'clock in the morning and kept out until four o'clock in the afternoon." We think that the defendant has not complied with the statute, by the removal of the bottom of "fall five," and leaving the balance of all the bottoms in all the falls in place, and remaining away from the same while in that condition for a whole week. We are therefore convinced, that the defendant, or licensee, did not remove the bottoms or so adjust the same as to make it impossible to catch fish, during the prohibited hours. The disabling of the basket is the one thing required by the act, and that to remove but the one bottom of this fish basket in question, and no more, when located in the open streams, with the ordinary rains and rise and fall of the water, and to leave it in that condition for a week, without any supervision or inspection, is not a compliance with the provisions of the eighth section of the act of May 1, 1909.

While it may not be necessary to remove all the bottoms in the basket each day, yet it is necessary to remove more than the bottom in one fall, in order to disable the basket, so as to make it impossible to catch fish during the prohibited season, and especially is this true, when the licensee expects and intends to remain away from his basket for several days at a time.

Under the admitted facts, we believe the defendant was properly convicted by the justice of the peace.

Our present inquiry is confined to the question, whether there is sufficient evidence to sustain the judgment of guilty entered by the justice of the peace. We believe there was sufficient evidence to support the conclusion at which the justice arrived. The legal question involved, under the facts, was, we think, properly decided.

And now, to wit, September 24, 1912, the rule granted in this case to show cause why an appeal shall not be allowed the defendant, is hereby discharged.

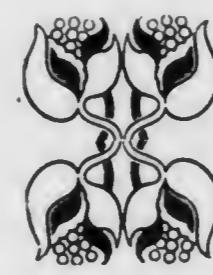
By the Court,  
WM. MAXWELL, P. J.

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